Railway Age

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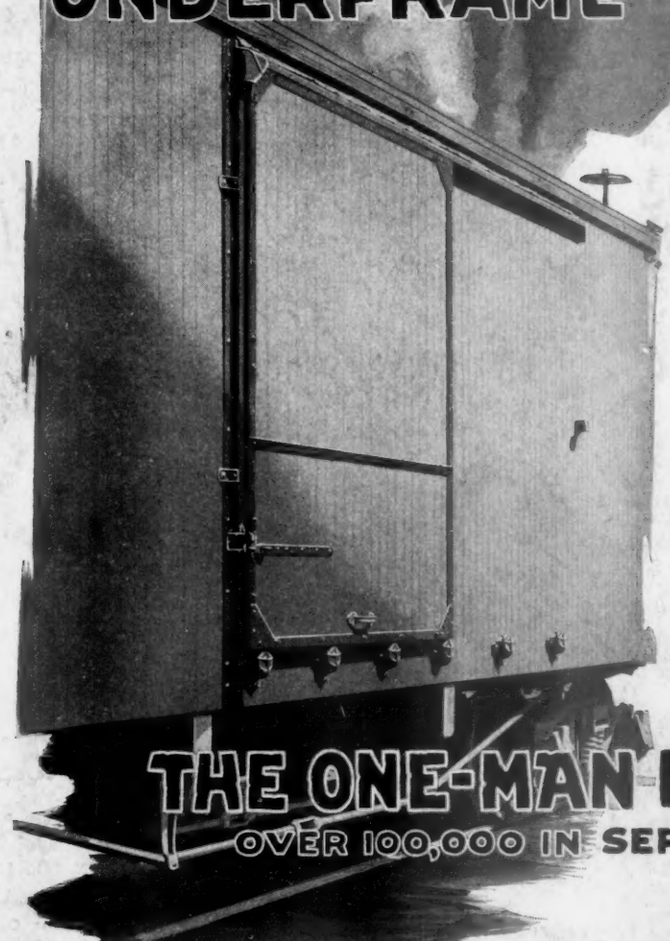

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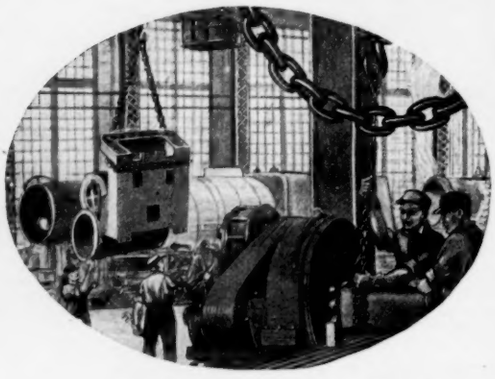

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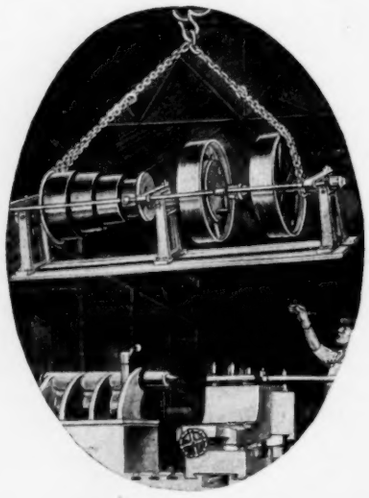

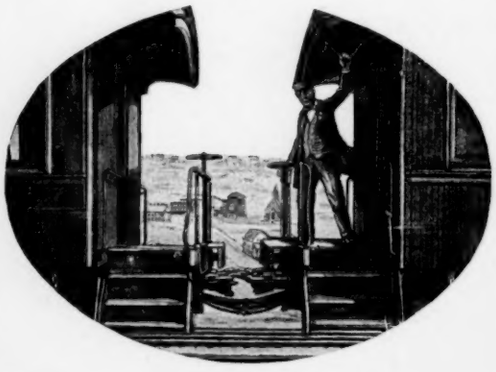

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EDITORIAL

Railway Age

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One of the greatest gains accruing from the motor car is the facility it affords the maintenance of way supervisor to visit the foremen under his jurisdiction. It is only a short time since practically all detailed inspections by the roadmaster were made from the deck of a hand-car, and the extreme slowness of this form of transportation coupled with its high cost in man power served to discourage its extended use. But now that the motor car is available, it is a question whether its full use to this end is not prevented in many cases because the supervisor's territory is so large that it is only through the use of the non-stop passenger trains that he is enabled to cover his territory at sufficiently frequent intervals. Supervision from the back of a train is admittedly inadequate. Letters, circulars and "butterflies" do not take the place of that personal touch with is obtained only through verbal intercourse. Any roadmaster will prefer a five-minute conversation to an entire week of correspondence if it were only possible for him to hold such conversations with his foremen as often as would be necessary. There never was a time when personal contact between officers and subordinates was more necessary than at present, and surely there are cases where the supervisor's territory should be adjusted to make this more intimate supervision possible.

Supervision That Supervises

A number of the granger lines have been active in settling up large areas in the Western states through the activities of their colonization departments. These roads and others in the Southern states have been equally active in aiding the farmers in the development of their agricultural resources. These measures have been fostered by the desire of the roads to develop traffic. At the present time one of the most urgent needs of the roads is for facilities to handle the present traffic and they are confronted with the necessity for the prompt handling and the heavy loading of cars in order that those available may be made to render the maximum service. A manufacturer in an Eastern city found recently that by installing mechanical facilities for the unloading of his coal he was able to reduce the cost of this work from $1 per ton to $0.15 while at the same time releasing cars more quickly. This incident suggests the possibility of the railways creating a special department to present to their patrons the opportunities of this character. It is true that local operating and traffic officers are now circulating among their patrons for this purpose, but they are not able to study the individual needs of a shipper in such detail as to enable them to bring to him those helpful suggestions that a specialist could make. Neither do they have the broad viewpoint of a man traveling over a system, but their information is limited primarily to those developments on their respective divisions. Much improvement can be effected in the use of cars by bringing to a shipper concrete suggestions as to means of handling his freight more economically to himself as well as releasing cars more quickly. The conservation of equipment is of more than usual concern at the present time but the lessons now being learned should be remembered after the present crisis has passed and the work of such a department can be made of permanent value.

Help the Shipper Unload Cars

"Motive power represents about eight per cent of the capital investment in a railroad. Small as this percentage is, the remaining ninety-two per cent of the investment is obviously wholly dependent upon its earning capacity." Thus F. D. Underwood, president of the Erie, concisely sums up the importance of motive power in railroad operation. At the present time, when the railroads are striving for increased efficiency, it is not enough that railroad officers should recognize this fundamental truth; they must also apply it. The three items of wages of train and engine crews, fuel and repairs to locomotives constitute more than one-third of the operating expenses. The type and condition of motive power affects expenditures falling in these classifications directly and many other items indirectly. New locomotives designed with particular regard for the service in which they are used would of course be most effective in reducing costs. The replacement of all existing motive power is out of the question but old locomotives can be brought up to the same standard of efficiency as the most modern engines, and in most cases by adding a negligible amount to the investment in motive power. Several of the methods succesfully used for increasing capacity and reducing fuel consumption and maintenance costs have been described in previous editorials. Will your road profit by the experience of others in this matter or will it fail to take advantage of the savings that can be secured by concentrating attention on improving the vital eight per cent of its property—the motive power?

Little Capital Needed, Large Return Assured

The *Railway Age* has outlined the important steps towards fuel economy that should be taken by every railroad. The ten fuel commandments have dealt with the functions of an organization devoted to fuel conservation, with the duties of the mechanical department with respect to locomotive maintenance, with the obligation of the transportation department to co-operate in every fuel saving action, with the responsibility of the purchasing agent to differentiate between good and bad coal and of the management to adopt a consistent policy towards its purchase. Each one of these measures can be directed toward fuel saving whatever the facilities at hand. Meagre shops, crowded engine terminals and antiquated locomotives may be disheartening but they do not constitute a good excuse for failure to observe any of the ten fuel commandments. While it is obvious that the railroads should make the most of the means at hand to promote fuel economy, it is apparent that these facilities must be bettered. What is the outstanding purpose of recent legislation if not to enable the railways to rehabilitate their equipment and bring their operating mechanism to a state of maximum efficiency? The meagre shops must be made adequate, the crowded engine

The Last Word on Fuel Economy

terminals must be enlarged and, above all, the antiquated locomotives must be modernized and new ones built. The new law does not say that the railroads must save coal but how long will the public acquiesce in the payment of advancing freight and passenger rates if it becomes apparent that an undue portion of this revenue is for fuel bills that are excessive because the railroads have failed to replace small locomotives with large locomotives or to utilize brick arches, syphons, superheaters, feed-water heaters and many other devices with a demonstrated capacity for saving coal? Will the railroads be permitted to say that they cannot afford these improvements?

Fighting a Ten-Million-Dollar Fire

The Railway Fire Protection Association, now seven years old, is a vigorous organization. These men are constantly aiming to make railroad employees (and officers) 100 per cent efficient in the prevention of fires; and they keep at it so persistently and with such precise adaptation of means to ends that they may be called idealists—practical idealists. The spirit of the Baltimore convention, reported in this and the preceding issues, is epitomized in the speeches at the beginning and at the end of the sessions. Mr. Berry, in opening, emphasized the necessity of cultivating the intelligence and conscientiousness of all employees, if real progress is to be made in reducing the railroads' ten-million-dollar annual fire loss; and Mr. Elmore, at the close, reminded his fellow members that their success would be far from satisfactory until they should get the responsible managing officers waked up. The fire-specialist's problem, like that of the train despatcher who is responsible for making meeting points safely on a single-track railroad, is always a strenuous proposition; the dropping of a single stitch may mean utter disaster. He is entitled, therefore, to call to his aid every instrumentality that he can get hold of. A single fire officer on a big railroad has to spread himself out exceedingly thin; and he must be able to use the right arm of the general manager or else waste much of his energy.

The Railways of Bolivia

In this issue will be found the sixth of the articles written by John P. Risque, who was recently sent to South America by the *Railway Age* to study the transportation systems of that continent. The article in question deals with the railways of Bolivia and is the first of two dealing with that country. The present article relates to the connections between Bolivia and the Pacific coast. Bolivia has no seacoast of its own, it having lost its "window on the sea" some years ago as a result of differences between Peru and Bolivia on the one hand and Chile on the other. Its capital, La Paz, is, however, reached by three lines of railway—one, the Southern Railway of Peru, previously described in this paper, two, the Arica La Paz, an unusual railway line said to have the longest stretch of rack railway in the world, and three, the Antofagasta & Bolivia. The first and third are British-owned. The second is owned by the government of Chile. The Antofagasta & Bolivia is one of the richest railways in South America. It reaches the Pacific at Antofagasta in Chile and is noteworthy, among many other reasons, because it supplies a most excellent passenger service on a meter gage line. The second article, which will be published shortly, will continue the description of this interesting property. It will also consider the projects that are being put forward to give Bolivia an outlet to the Atlantic. The principal point to be borne in mind in reading the two articles is that Bolivia is an exceedingly rich country, especially from the standpoint of its minerals. Our interest in transportation there lies to no small extent on the importance of the railways as a means of making available to the rest of the world the great mineral resources within its borders.

Normalized Steel Castings

It might almost be said that the modern locomotive would be an impossibility without steel castings. Certainly these castings have increased in size and intricacy to a remarkable extent within the past few years, the total tonnage used annually on American railroads being extremely large. In order to secure the maximum service and reduce the number of failures, steel castings should be normalized before use. Steel, as it comes from the manufacturer, may be in any one of several different states as regards its microstructure, but if it is heated to approximately 1,832 deg. F. and cooled very slowly, it is said to be normalized. This has a decided effect upon the physical properties. In a steel casting of .30 per cent carbon content the tensile strength will be increased from 54,000 to 73,000 lb. per sq. in., the yield point from 20,000 to 50,000 lb. per sq. in., the elongation in 2 in. from 13 to 28 per cent, and the contraction of area from 20 to 35 per cent. This is a gain of approximately 150 per cent in the working strength of the steel, a gain not to be overlooked. Steel castings for both locomotives and cars should be normalized by heat treatment. To accomplish this and make certain that proper heat treatment is accorded, suitable furnaces and pyrometer equipment should be installed in railroad shops. Accurate knowledge of temperatures is essential and can be obtained only by the use of pyrometers. The total cost of normalizing castings including fuel, labor, maintenance of equipment and overhead costs, is about $3.26 per ton, a relatively small price to pay for more than doubling the strength of steel castings.

Railway Office Equipment

A number of years ago it would hardly have been believed that a railway office could be made a subject for the use of machinery. Today, however, it is realized that modern mechanical devices have as much use in the office as in the roundhouse or shop. In fact, so great has been the progress in the development of adding, calculating, tabulating machines, etc., for railway and other office use that they are now recognized on the progressive railroad as absolute necessities. The mechanical devices have so proved their worth as compared with the old ways of figuring with pad and pencil that now it is no longer a question of the advisability of installing these mechanical aids. It has became a question of deciding upon the most suitable machines for the particular purpose in view and of working out the best methods of using the equipment. It will, of course, have to be admitted that there are many railroad officers who have not yet realized how eloquently the roads that have adopted modern equipment for their accounting and other offices bear testimony to the efficiency obtainable through its use. Possibly one reason may be that the machines are looked upon merely as labor-saving devices. The labor-saving element, however, is only one part of the argument, though a most important one. Many roads which have installed mechanical equipment have found that they are securing a greater degree of accuracy than was possible to attain under the old methods. They are also finding that they are getting the work out more expeditiously although using less labor and less office space. In fact, some offices which before mechanical aids were installed had great difficulty in getting the work out at all, now discover they are the envy of less fortunate neighbors.

Enormous Increase in Loss and Damage of Freight

FEW ITEMS of railway operating expenses have increased so much in proportion within recent years as payments for loss and damage of freight. It is, therefore, both timely and gratifying that the railways should have begun a concerted movement through the American Railway Association to reduce this item of expense. We publish elsewhere in this issue an article regarding the organization for the reduction of loss and damage which is being formed as a part of the American Railway Association, and also a notice of the "Freight Claim Prevention Congress" which has been called by President R. H. Aishton to be held at the Hotel LaSalle, Chicago, on November 15 and 16.

Some statistics regarding developments within the last six years will indicate why railway managers are becoming greatly disturbed upon this subject. In the year 1914 the railways transported the equivalent of 288,000,000,000 tons of freight one mile, and had freight earnings of $2,115,000,000. The loss and damage payments in that year were $32,376,000. Three years later, in 1917, their ton mileage was 394,500,000,000; their freight earnings $2,820,000,000, and their payments for loss and damage of freight $35,080,000. The increase in freight movement was 37 per cent, the increase in freight earnings 33 per cent, and the increase in payments for loss and damage only 8.35 per cent.

In 1918 the total freight moved by the railways under government control was only 1.8 per cent greater than the amount handled by the same railways in 1917. The freight earnings of the Class I railways, chiefly because of advances in rates, showed a large increase, being $3,458,000,000, and the payments for loss and damage to freight jumped up to $55,634,150, an increase over 1917 of 58 per cent, and over 1914 of 71 per cent. But this was nothing compared with what occurred in 1919. In that year the freight movement was almost 10 per cent less than in 1918 and substantially less than in 1917, although, because the advanced rates were in effect throughout the year, the freight earnings increased to but $3,557,000,000. Meantime, loss and damage payments increased to $104,244,000. With less freight handled than in 1917 the increase in loss and damage payments over that year was approximately $70,000,000, or 197 per cent. With an increase in freight business handled over 1914 of about 40 per cent, there was an increase in loss and damage payments of 222 per cent.

The statistics show that whatever the other effects of government operation may have been, it certainly did not have the effect of reducing loss and damage to freight. The average increase in the prices of commodities between 1914 and 1919 was approximately 100 per cent. This doubtless accounts for almost one-half of the increase in the total amount of the claims paid. Another large part of it was due to the fact that the amount of freight handled in 1919 was about 40 per cent more than in 1914. There remains a large balance of about one-third of the total increase of loss and damage payments which must have been due to absolute increase in the amount of freight lost and destroyed.

The total increase in railway expenses since 1914, and especially since 1917, has been very large and the increase in loss and damage payments has been by no means a small part of it. It is conservative to estimate that by securing more efficient operation and the co-operation of shippers in the way of better packing, marking and routing of freight, the managements should be able speedily to reduce loss and damage payments by at least $50,000,000 a year. If this large saving were to be added to net return, it would pay interest, even at the high rate of 7 per cent, on over $700,000,000 a year of new capital invested in the properties.

The Freight Claim Prevention Congress which has been called should be attended by representatives of all the railways in the country in order that the work of the new committee on the Cause and Prevention of Claims may be started with the needed enthusiasm and backing. Recent developments have shown that it is not only necessary that the railways should handle all the traffic they can with existing facilities, but also that if they are to earn adequate returns on existing rates they must be operated with the utmost practicable economy. No part of the present operating expenses needs vigorous attack more than the item of loss and damage of freight.

A Difference of Arithmetic

THE COURT OF INDUSTRIAL RELATIONS of Kansas thinks it has discovered "a serious error of such magnitude as to challenge attention" in the calculations on which the Interstate Commerce Commission based the rate increase which it allowed to the western railroads. In its opinion in the Kansas intrastate rate case allowing an increase of only 30 per cent in freight rates, with some exceptions, it set forth a calculation of its own, attempting to show that the federal commission allowed the western roads $192,853,686 in excess of the amount necessary to give those roads a return of 6 per cent on the valuation of $8,100,000 which the commission placed on the western roads.

This statement, when published in the newspapers, naturally attracted attention but an examination of the opinion reveals at once that the federal arithmetic, at least, is superior to the Kansas brand, regardless of differences of opinion that may exist as to the relative value of their judgment as to reasonable freight rates. The Kansas court figured that a 6 per cent return for the western roads as a whole would be $486,000,000, that the roads were already earning a net railway operating income of $170,000,000 and that they would receive from the increased passenger rates, etc., about $115,000,000, while the wage increase would amount to about $237,000,000. Therefore they would need a freight rate increase of $438,500,000 to make up the 6 per cent return. This, the court says, would be an increase of only 24.3 per cent when applied to the estimated freight revenue of the western roads, whereas 35 per cent of the estimated freight revenues would be $631,000,000 or $193,000,000 too much.

The answer, of course, is that the Interstate Commerce Commission did not give the western roads as a whole an increase of 35 per cent, but allowed only 25 per cent in the Mountain-Pacific group. A preliminary estimate made by the Bureau of Railway Economics immediately after the rate decision was made placed the increase in freight revenues for the Mountain-Pacific group at about $138,000,000 and for the rest of the western district at about $330,000,000, or a total of $468,000,000. This is about $28,000,000 more than the amount the Kansas court figured the western roads were entitled to, and while the Bureau made no claim for exactness in its estimate, its figures at least reflect the fact that the increase in freight revenues of the western roads will be less than 35 per cent by the amount of 10 per cent of the freight earnings of the Mountain-Pacific group. Even on the basis of this estimate the commission gave the western roads slightly more than the Kansas court considers they were entitled to, but it gave the eastern roads a higher percentage of increase than they asked for and the southern roads less than they asked for. The requests of the railroads were based mainly on the results of the constructive year ended October 31, 1919, with adjustments to reflect conditions at the end of and subsequent to that period. The commission, however, also had before it when it rendered its decision the reports of operations for the first four months of 1920, which showed even worse results for the eastern and

western roads than the constructive year, while it showed better for the southern roads than the results of the constructive year.

I. C. C. Notes Increase in Railroad Efficiency

THE MARKED IMPROVEMENT in the efficiency of railroad operation during July and the first seven months of this year for which the freight operating statistics are now available, as compared with the corresponding periods of 1919, and in many respects as compared with any previous records, is pointed out in a statement compiled by the Bureau of Statistics of the Interstate Commerce Commission made public by the commission on October 22, which is printed elsewhere in this issue. The statement not only shows the improvement made during the year and as compared with 1919, when the railroads were being operated by the government, but also that in July the roads performed probably more freight service than ever before in a single month, and that the traffic of the first seven months of 1920 indicates that the year's figures will exceed all past records. The car loading figures compiled by the Car Service Division of the American Railway Association indicate a still further increase in traffic from August 1 to October 9, a total of 9,637,941 as compared with 9,351,416 in 1919 and 9,590,090 in 1918. It is also shown that the average freight trainload of 769 tons for July is greater than the average for any month during federal operation.

The principal facts shown in the commission's statement have already been reported in this paper, but the statement makes a detailed analysis of the freight operating statistics with some explanation of the conditions. It has been received with particular interest, however, because of the form in which it was given out, as the commission usually gives out its statistics in tabular form and without comment or much in the way of interpretation.

The commission has never gone out of its way to express very plainly its opinion of the results of the experiment in government operation of the railroads which was conducted for 26 months by the Railroad Administration, and the statement prepared by the Bureau of Statistics does not specifically refer to the fact that it is comparing the results of private operation under commission regulation or supervision with the results of what has been described as unregulated government operation. It does show in several places, however, that the comparison is with Railroad Administration statistics and in addition to showing the improvement in operating efficiency as compared with 1919, when some of the factors were affected by the low volume of business offered to the railroads during the first part of the year, it also shows that in some respects the railroads have done better this year than they ever did before, even in the years when they were operating under the pressure of war necessity.

Under the transportation act the Interstate Commerce Commission has been given a greater degree of responsibility for the success of railroad operations than it had before, as well as a greater authority over the actual operation. As it has been co-operating very closely with the railroads in exercising its emergency powers over car distribution since it was requested to do so by the railroad executives in May, after the switchmen's strike, it may be that the commission's statement should be considered as an example of pointing with pride rather than as an invidious comparison.

In referring to the increases in the cost of operation this year the statement says "the explanation is not available" for the increase in the cost of enginemen and trainmen per freight train mile in July, 1920, as compared with July, 1919. The cost of enginemen increased from 22.6 cents to 28.1 cents and the cost of trainmen increased from 26.1 cents to 31.6 cents, but the increase from January to July is only 1 cent in the case of enginemen and seven-tenths of a cent in the case of trainmen, so most of the increase occurred between July, 1919, and January, 1920. The fact that the Railroad Administration gave the enginemen and trainmen time and one-half for overtime last December would seem to afford a satisfactory explanation for at least part of the increase.

Relative Advantages of Modern Steam and Electric Locomotives

ELSEWHERE in this issue will be found a report of the joint meeting on November 22 of the New York sections of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers and the Railroad Section of the A. S. M. E. The subject considered was "The Relative Advantages of Modern Steam and Electric Locomotives." The meeting was addressed by advocates of both steam and electric traction and its importance lies in the fact that the two sides appeared in what was practically a joint debate on the subject of steam railroad electrification. We fear that most of the large audience in attendance went away with the same opinions with which they came. The difficulty was that there was such a great bulk of material presented that it was impossible to assimilate it.

The majority of the papers were presented by ardent advocates of steam or electric traction who gave little or no consideration to the point of view of the other side. It is most unfortunate that a meeting so well launched did not result in the crystallizing of some of the vast amount of high grade data available. Here was an occasion in which the advocates of electrification found themselves on the same side of the fence and yet so much did they adhere to generalities and lay themselves open to criticism that they failed entirely to gain their point. They were fortunate, however, in that the advocates of steam operation did not take advantage of this fact or themselves take care to avoid the same faults. It is to be regretted that the discussion of electrification should be carried on in this way.

A perusal of the papers will bear out this conclusion. The electrification advocates were again guilty of making unfair comparisons. Thus one of the speakers did not hesitate to compare the operation of modern electrical equipment on the Chicago, Milwaukee & St. Paul with the results that were obtained many years ago on that road with Prairie type locomotives. He did admit, however, that this was not an absolutely fair comparison and said that operation with modern Mikado locomotives might show different results. On the other hand, one of the advocates of steam operation was unkind enough to compare the train loading on the Virginian Railway with that on the electrically operated divisions of the St. Paul. He did not draw attention to the fact that the Virginian carries bituminous coal almost exclusively whereas the St. Paul's traffic is of a very miscellaneous character not conducive to heavy train loading. These are only two examples of many such that might be mentioned.

Apparently the advocates of electrification do not yet realize how greatly the efficiency of the modern steam locomotive has been improved in recent years. Some may refer to the railroads' conservatism. The burden of proof is on those who make that statement, for the rapidity of the replacement of wooden by steel cars, the enlargement in the capacity of all kinds of cars and locomotives, the introduc-

tion of automatic block signaling, etc., are certainly not signs of conservatism.

The electrification advocates apparently do not realize the nature of the sales problem before them. They have long since sold electrical engineers in all lines of industry. At present they are trying to sell the general public. It would seem, however, that the real buyers in this sales campaign are the railroads. The present task of the advocates of steam railroad electrification may properly be said therefore to be the selling of their idea to the hard-headed railroad executives and operating men. These men were brought up and educated under steam operation. They are, however, open-minded to the value of electrification and ready to spend large sums of money, if it is available, and if it can be shown that such expenditure will result in sufficiently lower operating costs to make such expenditures advisable. The advocates of electrification, in their presentation, made little, if any, progress in this direction; indeed neither side showed a real appreciation of the necessity of basing its argument on simple, sound economics.

Railway Employees as Capitalists

We frequently read reports of workingmen engaging, through their labor unions and otherwise, in co-operative movements to set themselves up in business. A short time ago the newspapers published an interesting article about workmen in the building trades in one section of the country paying assessments from their wage into a fund to be loaned at a substantial rate of interest to persons desiring to erect buildings on whose construction the workmen raising the fund would be employed. Certain classes of railway employees have been among the leaders in these co-operative movements. The maintenance of way employees' union some time ago acquired one or more factories in which it intended to make overalls and other clothing for sale to its members and other workingmen. Some of the railway brotherhoods are furnishing the capital for the establishment of a bank at Cleveland in which it is understood labor organizations in particular, and the public in general, are invited to deposit their funds.

These movements by workingmen to accumulate capital by saving their wages, and to invest it in business concerns to be managed by their own representatives, are a healthy sign and deserve commendation and encouragement. But why do railway employees continue to carry on propaganda in favor of the government acquiring the railways and turning them over to the employees to operate when, at the same time, they are co-operatively engaging in other businesses? Why, if they desire to manage the railways and also to engage in business, do they not increase their savings, pool them, and invest them in the railroad business? They want to manage the railroad business because they are employed in it. They can become the managers by becoming the owners. Why, therefore, do they not take steps to become the owners?

The feasibility of the employees acquiring control of the ownership of the railways repeatedly has been demonstrated in the *Railway Age*. As we pointed out recently, they could, merely by saving their recent advance in wages of $625,000,000 a year and investing it in railway stocks, become owners of a majority of the stock of all lines within five years, even if they had to pay par for all the stock they bought; and, as was pointed out at that time, the present market prices are much below par.

Developments which recently have occurred have made it easier for railway employees to save large parts of their wages. Between July, 1914, and July 1, 1920, the average increase in the cost of living in the United States, according to the National Industrial Conference Board, was 104.50 per cent. The advance in wages granted to railway employees from July 1, 1914, to the end of July, 1920, averaged, according to different estimates, from 115 to 130 per cent. The exact percentage of increase will not be known until complete figures showing their exact earnings on the present basis of wages are available; but such figures as are now available indicate that the average increase in railway wages since 1914 will be shown to have been not less than 120 per cent.

Ever since the last advance in railway wages was made the cost of living has been declining. The National Industrial Conference board reports that on October 1 it was only 97.50 per cent more than it was in 1914. Therefore, it would appear that at the present time it is costing the average railway employee to live as well as he did six years ago only 97.50 per cent more than it did then, while, although he is working shorter hours than he was then, he is receiving wages at least 120 per cent greater. Even in 1914 many railway employees were saving money and investing it in homes, depositing it in banks, and so on. If they could save some money then, they could save in the aggregate a vastly larger amount now.

Whatever may have been true in the past, there can be no question that at present the approximately 2,000,000 employees, with their approximately $3,600,000,000 a year of annual wages, could in the aggregate save a vast amount of money. They are greater capitalists, potentially at least, than the stockholders of the railways, for their annual wages are nine times as great as the largest amount of dividends ever paid to the stockholders in any year.

It may be said, and in fact is said, that the stocks of the railways are watered and therefore would not make a sound investment for railway employees. But the very criticisms which the spokesmen of the Plumb Plan League use against the Transportation Act are the best answer to this contention. They say that the Transportation Act and the recent rate advance decision of the Interstate Commerce Commission under it have "validated" all outstanding securities and assure to the stockholders large returns. If this is true, the Transportation Act and the decision of the Commission have made railway stocks the best investment possible for railway employees, for it is hardly conceivable that if the employees became the owners of large amounts of stock Congress or the Interstate Commerce Commission would reduce the valuation that the Commission has placed upon the railroads, or the percentage of return the railways are to be allowed to earn upon that valuation.

Developments within recent years have made it more than ever essential to the welfare of the country that wage earners, and other men of small incomes, shall save their money and invest it in business. The present excess profits and income tax laws take from owners of large amounts of industrial and railroad securities a large part of their incomes from these securities. This reduces the ability of concerns and persons with large incomes to increase the amount of capital invested by them in business concerns. In addition, it makes their incomes from industrial and railroad securities so relatively small as compared with the incomes they can derive from tax free government bonds that they are largely avoiding investment in industrial and railroad securities and putting as much of their money as they can in government securities. The consequence is that the amount of capital being accumulated by the rich and invested in business enterprises is relatively declining. But constant increase in the amount of capital invested in business is absolutely essential to the welfare of labor. It may be said with approximate truth that the amount of capital invested in the industry, transportation and commerce of a country determines the

amount of labor that can be employed and the amount of wages that can be paid in it.

Unless people with large incomes are to be enabled to increase more rapidly the amount of capital invested by them in business, workingmen and other people of small incomes must provide the needed additional capital from their savings or we shall meet with a national disaster in which the wage earners will be the chief sufferers.

Some newspapers, in commenting on our proposal that railway employees, instead of advocating the Plumb plan, should save their own money and acquire control of the railways, have intimated that we speak in an ironical vein. On the contrary, we are entirely serious. We sincerely believe that the best solution of the labor problem would be the establishment of true "industrial democracy." Our conception of true industrial democracy, however, is not government purchase of industries and their irresponsible management by their employees, but purchase of the industries by the employees with their own money and responsible participation by the employees in the management in proportion to the interest in the properties which they acquire.

It is as astounding as it is inconsistent that railway employees should be paying people to go about the country and carry on propaganda to get the public to tax itself to buy the railroads and turn them over to the employees to manage, when the employees, by the use of a very reasonable amount of thrift and brains, could themselves in a short time become the owners of control of the railways with an indisputable right to manage them.

New Books

Proceedings of the American Railway Engineering Association: 6 in. by 9 in., bound in cloth or paper, 1,477 pages, illustrated and including also a separate packet of drawings. Published by the American Railway Engineering Association, Manhattan Bulding, Chicago.

The character of information and the typography of this volume of the proceedings of the American Railway Engineering Association follow the standards of the previous volumes except that this is the only case in which drawings have been issued in a separate package instead of being bound in as folded inserts. These comprise some 60 track plans and some illustrations of concrete track construction. One other difference in this volume is that the monographs have geen generally inserted with the reports of committees covering related subjects rather than grouping them as a separate section of the volume. The book is somewhat larger than those published in the last two years and contains a large fund of information that will be found of value to railway engineering and operating officers. An unusually large proportion of new specifications are incorporated in this work, covering matters of no less importance than iron and steel structures, masonry, rails and track scales, the latter being the specifications drawn by a joint committee of various interests involved. Another important feature of this volume is the progress report by the Committee on Stresses in Railroad Track covering 170 pages and containing a large amount of original information not available in any other form. As matters of record a report on the electrification of the Chicago, Milwaukee & St. Paul and an account of the unification of terminals during the period of government control are of value. The report of the Committee on Rail, 179 pages, contains the usual rail failure report and considerable new information in the form of scientific studies of defects in rails. The proceedings of the last convention of the association in the form of discussions of the various committee reports submitted cover 134 pages.

Letters to the Editor

Safe Watch Dials

PHILADELPHIA, PA.

TO THE EDITOR:

The article on "Safety and Time Service" by Webb C. Ball, general time inspector of the Bureau of Railroad Time Service, in the *Railway Age* of October 8, in treating of the "railroad standard watch" says: "Another very important factor of safety is the dial, that part of the watch which quickly and surely reveals the correct time to the engineer, the conductor and other trainmen. As this information is often required at night when lights are dim and obscure, it is needless to emphasize the importance of dials that give the hour and minute without any confusion of fantastic figures or freakish designs."

That well describes the essential requirements of a railroad watch dial. The specifications read: "The figures should be 12 plain upright Arabic figures to indicate the hour points," etc. Each of the three dials of the standard watches, shown in the illustration, has 11 sets of Arabic figures indicating the hours; there is no figure at the hour of six. As it takes three minutes for the minute hand to traverse each set of the Arabic figures, the minute hand is more or less merged into figures underneath it for 33 minutes while traversing the 60 minutes around the dial.

Compare this with a white dial having Roman numerals—the XII at the stem of the watch—plain black hands, proportioned to the size of dial; compact Roman numerals and a clear white background, causing the black hands and numerals to stand out clearly and distinctly. Notice how beautifully the minute hand lines with each numeral, crossing it in about a minute—in less than half the time required to traverse the sprawling Arabic figures.

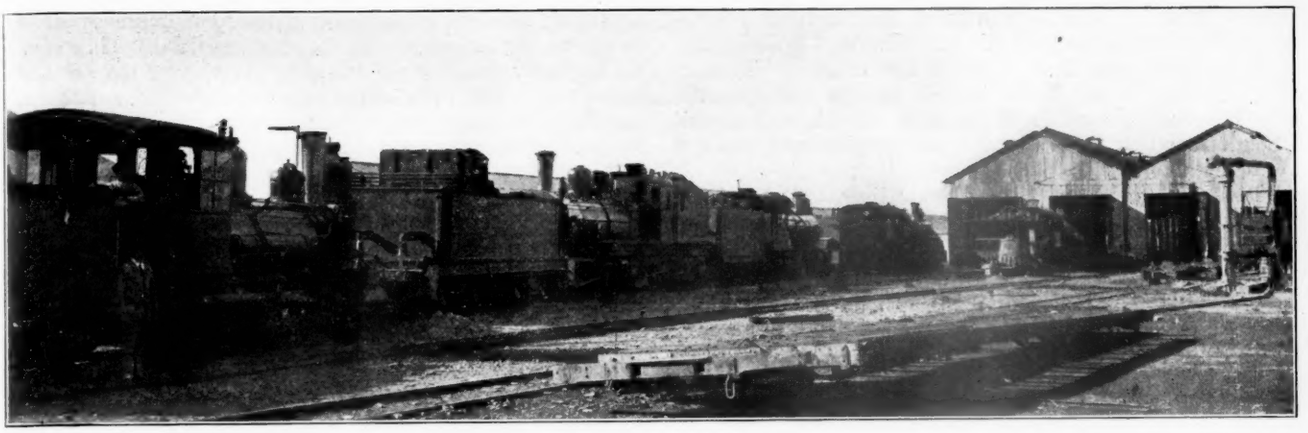
A varied experience in railroad train service taught me the advantages of a clear white dial with black hands and compact hour indicators; advantages which seem best attained by using Roman numerals. Further experience and thought on this subject has led me to think that all station clocks, and in fact all public clocks, should bear the Roman numerals. That type of dial seems to best conform to Mr. Ball's excellent specifications for "dials that give the hour and minute without any confusion of fantastic figures or freakish designs."

All clocks that I can recall seeing in jewelers' windows, to show the correct time, bear the Roman numerals. Practically everyone can read the dial of a time piece, and the figures or numerals on them are more for indication than information. In fact, few people know that on watches with Roman numerals the fourth hour is shown by four strokes instead of IV.

The aim is to provide a watch dial that can be read accurately at a glance; to accomplish that the hands should be properly proportioned and the markings compact but distinct; more than that seems like a defacement which tends to defeat the purpose.

WILLIAM H. SIMMS.

IVY L. LEE, formerly assistant in the executive department of the Pennsylvania, has recently been appointed by the board of directors of that company to act in an advisory capacity in matters of publicity and public relations. In the conduct of this work, Mr. Lee will report to the president and the vice-presidents and co-operate with the road's publicity department.



Types of Power of the Antofagasta & Bolivia in the Yards at Oruro

Meter Gage Railways the Standard in Bolivia

This Is Sixth of a Series of Articles by Railway Age's South American Correspondent

By John P. Risque

WHEN THE TRAVELER or shipper with his eyes on Bolivia looks at that country's relative location on the map of South America, he will note with interest that it has no port of its own. Bolivia is entirely surrounded by its neighbors, Peru and Chile on the west, Argentina on the south and Brazil on the east and north. The only outlet

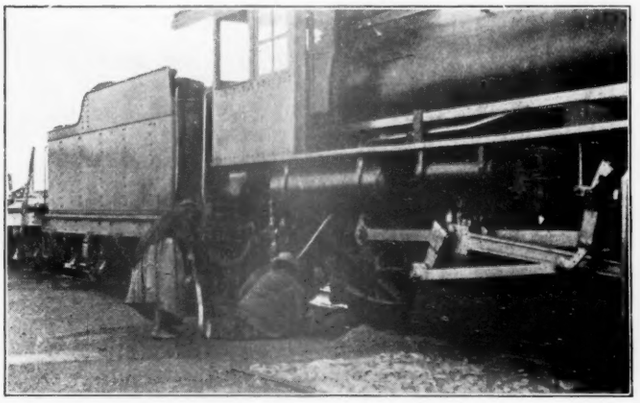
Station and Siding on the Arica-La Paz

to the Pacific coast and the outside world is through Peruvian and Chilean territory. Furthermore, the gigantic Andes, which all along the Pacific coast form a barrier between the interior and the sea, making construction and operation particularly difficult and expensive, exclude Bolivia even more from intercourse with the rest of the world. Bolivia had a small stretch of sea coast at one time, but three-sided hostilities with Peru and Chile have resulted in Chile's acquisition of all the ports that Bolivia had and some of Peru's vast expanse of coast.

Bolivian railways center in La Paz, the capital. Access to "the world's highland capital," as this city is known in the archives of the Pan-American Union, is had by three lines of railway: viz., the Southern Railway of Peru, the Arica-La Paz and the Antofagasta & Bolivia. A large part of the mileage of these three systems lies in Peru and Chile, but, since the terminus of all of them is La Paz, they may rightly be considered as Bolivian transportation facilities.

The Southern of Peru

The first of these lines—the Southern Railway of Peru—has been described in a previous article. It is a standard gage line beginning at Mollendo, a port in southern Peru, and leading up to Lake Titicaca, on the boundary between Peru and Bolivia. Here passengers and freight are transferred to steamers and carried across the lake, where a transfer to a rail line is again made—this time to one of meter gage—on which the trip to La Paz is completed. The meter gage can be said to be the standard for Bolivia, and



Indian Women Cleaning Ash Pan of Engine at Viacha, Bolivia, Southern Railway of Peru

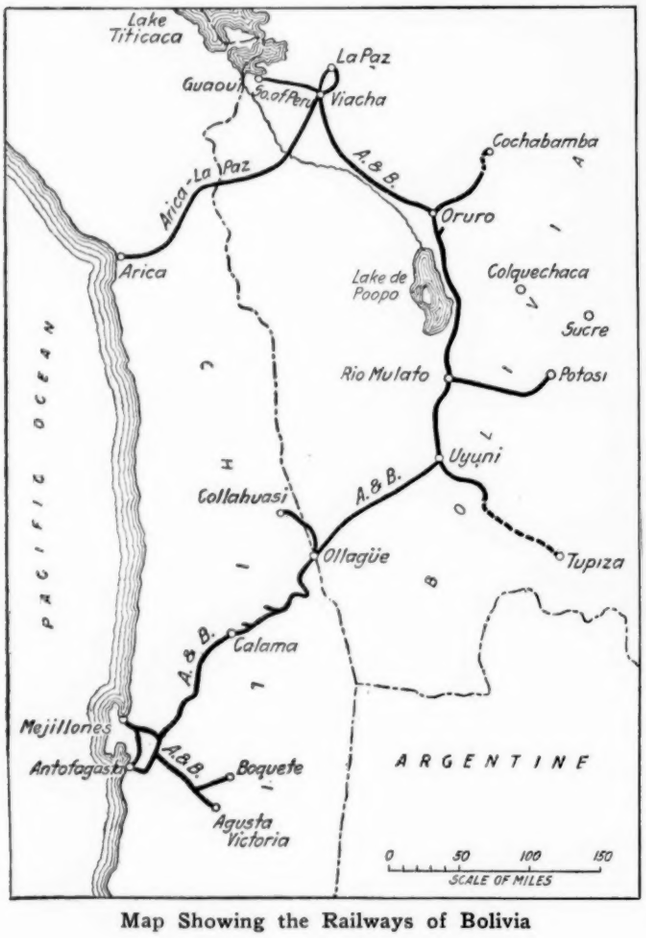
the railway representatives in the government are determined to maintain it.

The Arica-La Paz

The second line connecting La Paz with the Pacific is the Arica-La Paz Railway. It is owned and operated by the Chilean government, but the fact that it is in active com-

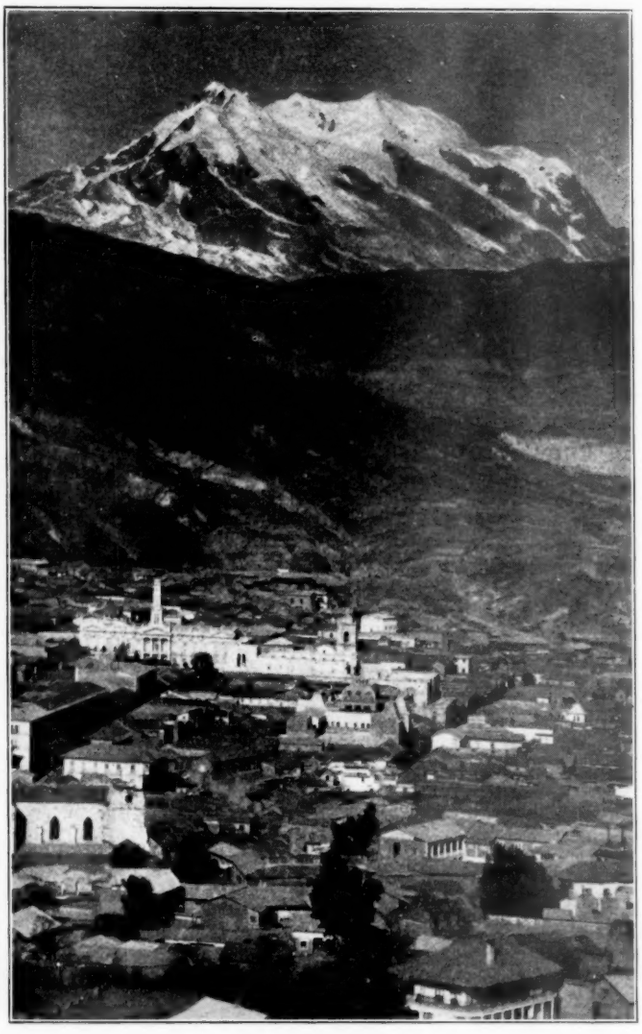
petition for the carrying business of La Paz makes it of interest in a discussion of Bolivian railways. This dismal stretch of meter gage track is about 248 miles in length, a trifle over half of which lies in that part of Chile known to the Peruvians, for obvious reasons, as the Alsace-Lorraine of South America. It leads over arid desert and through stretches of solid rock. It has over twenty-eight miles of rack rail, said to be the longest single line of rack rail in the world. The origin of the railway dates back to the treaty whereby Bolivia lost its outlet to the sea. Under the terms of the treaty, Bolivia ceded her claims for coast territory to Chile for $4,000,000 (Chilean pesos) on condition that Chile should build a railway from La Paz to the coast. It was further provided that the part of the railway lying in Bolivia should in 1926 revert to the Bolivian government.

Government administration has not put this line in a position to do for La Paz what its ambitious promoters had dreamed. The Southern of Peru is still hauling freight and passengers from a port inferior to that at Arica and over a line of 280 miles longer than the Arica-La Paz, with two transfers—from train to boat and back to train. The shorter



Map Showing the Railways of Bolivia

Arica-La Paz line had, upon its completion, all the promise of being the logical controller of the Pacific coast-La Paz traffic, but lack of equipment, due partly to the war and partly to the varying fortunes of Chile's bread-winner, nitrate, has held the line back. A recent addition of six American locomotives has improved the situation, but it is generally conceded that until some means are found to electrify the line, or at least the expensive rack-rail section, the Arica-La Paz will have to continue to divide the traffic with its more enterprising rival. Shippers of La Paz, in answer to questions as to the relative advantages of the services of the competing lines, reply that, owing to recent improvement of service on the Arica-La Paz, they are impartial. They complain greatly, however, of losses by thievery at the ports of both lines. The little rolling stock the Arica-La Paz has consists of a hodge podge of equipment from all nations. Most of the locomotives are of German manufacture for use



The City of La Paz with the Volcano Illimani in the Background

on rack rail lines, while the cars, both freight and passenger, follow, on a diminutive scale, our own designs.

Soroche

A more serious disadvantage of the Arica-La Paz line and one which will probably never be lived down is the almost invariable "soroche," a nausea brought on by the too sudden climb from sea level to high altitudes which passengers coming from Arica experience. For this reason, the more gradual ascent of the Southern of Peru is preferred by most travelers. Thus has a well conceived line to contend in its search for passenger traffic with a condition unfortunately beyond its control. The descent to the sea is not so bad, but, unless the traveler has calls to make in Arica, he will probably patronize the English owned and operated line to the port of Antofagasta further south in Chile—the Antofagasta & Bolivia.

The Antofagasta & Bolivia

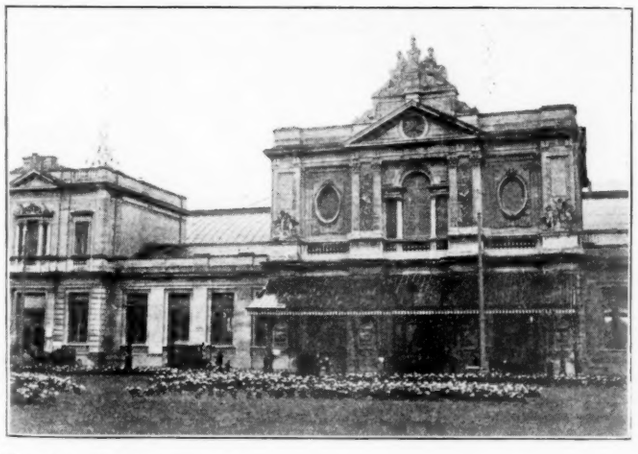
This last is the third railway from La Paz to the Pacific. From La Paz it makes a crescent shaped detour inland on its

720-mile stretch to Antofagasta, the chief port of northern Chile. More than two-thirds of its length lies within the boundaries of Bolívia. This road is said to be the most consistent little narrow-gage dividend earner in the world, and its physical appearance does not belie its alleged record. It is said to have paid 24 per cent. in 1917, with a ten-year average of 19.2 per cent. The chief source of income is the transportation of nitrate from some 24 "oficinas," as the nitrate plants are called, located in a 30-mile belt about 70 miles inland from Antofagasta. This commodity is all taken to Antofagasta or Mejillones, a few miles north, where it is loaded into ships bound for foreign ports. In 1915 over 800,000 tons of this product and 50,000 tons of copper were carried by this railway to these two ports.

As the train climbs slowly out of the 1,500-foot hole which holds historic La Paz, the traveler gets a good view of the supposedly extinct volcano, Illimani, the cone of which, covered with perpetual snow, towers up to an altitude of 21,182 feet. Oruro, a town of 8,000, and repair headquarters for rolling stock in that section, is the first stop. Here a short branch runs northeast to Cochabamba, the center of extensive mines of tin and silver. Between Oruro and the next station south there lies on the right a large fresh water lake which is said to receive 212,000 cu. ft. of water a minute, only 2,000 cu. ft. of which is known to flow out. Interest in the trip is heightened by the tourist's speculation concerning what becomes of the remainder. At Rio Mulato there is another branch to Potosi, 108 miles distant, at an elevation of 15,814 ft. This branch contributes great quantities of ore to the main line.

The only drawback to the passenger's heretofore uninterrupted and exceedingly comfortable ride is the necessity of arising early in the morning at Uyuni, leaving the meter gage sleeping car and boarding the yet smaller 30-in. gage sleeper standing alongside. The remainder of the trip is completed in this car. Plans are already under way for widening the Uyuni-Antofagasta section to meter gage. Meter gage rails are already laid running from the latter point to Calama, a distance of 149 miles. Uyuni is a point of some importance and has moderately complete repair layouts for locomotives and cars. The present importance, however, of this unattractive spot on the desert is said to be insignificant in comparison to what it will be when the Atocha-Tupiza-La Quiaca gap, referred to later on, running southeast of Uyuni in the direction of Argentina, is finally completed.

[The remainder of Mr. Risque's comments on the railways of Bolivia will appear in an early issue.]



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Railway Station at Louvain, Rebuilt by the Industrious Belgians to Show No Traces of War

Transportation and the Citizen's Responsibility*

By Alba B. Johnson
President, Railway Business Association

IF YOU ASK ME what is the most striking difference between the United States of 1920 and the United States of 1910 in the sphere of public opinion regarding railways I think I shall answer that in 1910 the majority of business men, certainly a majority of those who made themselves heard and felt, were inclined to emphasize managerial shortcomings, service annoyances and alleged impropriety in rates; and that in 1920 a majority of business men, including those who are most vocal and active participants in railway discussion, place primary emphasis upon making and keeping governmental and other public conditions such that competent men will be attracted and held in our transportation system as stockholders, as directors, as managers and as employees, to the end that the maximum of efficiency may be attained under private operation.

Nobody need tell me that there are still among us many manufacturers and merchants who have yet to perceive and acknowledge their responsibility for helping to work this problem out; but I believe what I have said is correct—that the preponderance of business sentiment is now a sentiment of responsibility and readiness to co-operate.

Let me indicate, first, the reasons why our national welfare requires that the railway situation shall be stabilized; second, the reasons why those interested in exports have a special stake in making our railway experiment a success; third, the reasons why the Transportation Act of 1920 is not yet to be regarded as having finally assured stability, or, in other words, what there is for you and me to do to accomplish that end.

Reasons for Stabilization

First, then, as to why our national welfare requires the railway situation stabilized. There are two excellent reasons. One is that if we don't get to a basis of satisfactory service Congress is going to take the roads again, and when that happens they won't go back. It will mean the end of private ownership and operation of railroads. We have seen something of government operation. We saw how disastrously it affected labor. We saw how unfavorably it affected maintenance and provision of facilities essential to keep pace with increasing demands for transportation. We are familiar with the unsatisfactory standards set by the post office. As users of transportation and consumers of things carried we may well regard such an outcome as a national calamity. But it means a great deal more. It means that when the government has its grip on the railroads it will reach out for other forms of business, beginning with public utilities and next embracing the great fundamental sources of production such as steel, copper and coal. The end of such a policy cannot be foreseen.

When that time comes, whatever kind of a country it leads us to, it will not be the America of which we have boasted as the land of individual opportunity.

The national welfare requires us to stabilize the railway situation because we are in a conflict to preserve the principle of individual ownership of property and of individual opportunity. The railways are the first trench.

Exporters' Special Stakes

Second—the reasons why those interested in exports have a special stake in making our railway experiment a success. It ought not to take many words to elucidate that. You who

* Abstract of an address before the American Manufacturers' Export Association in New York on October 14.

look abroad for a part of your market are engaging in the most relentless competition the world has ever seen. Assuming that you can match your rival in quality, you must beat him in price. Where does he fabricate? In every case in some little country scarcely bigger than one of our large states. Within that tiny area, Britain, France, Germany, Italy, anywhere you choose, the processes of manufacture are specialized each in a locality and the goods passed along one stage of production after another from this special locality to that. Distance is short, transportation cheap and certain. This means more than low freights. It means saving of time; it means frequency of capital turn-over and rapidity of delivery.

The cost problem in competitive export freight is an important part in the problem of developing our transportation system.

We must attain to a degree of speed and regularity that will offset at least in part the desperate splendor of our distances. Between centers, from the point of assembly to the seaboard—all our carrier mechanism, land, water, terminal, transfer, must be more than modernized; it must be carried to an excellence of which none of us have dared to imagine in our most extravagant dreams.

Wanted—A Program

Third—what is there for you and me to do about it?

In this room is there a business man who conducts his institution without a program for future development? What would your board of directors say if they asked you what enlargements of plant were scheduled for next year, and you replied that you had no schedule? I don't know what they would say, but I can imagine what they would do. They would get a new manager.

Is there a man in the room who knows what enlargements of plant are scheduled by the railways of the United States for next year or next month? Do you employ anybody whose business it is to know the answer? Are you affiliated with any agency that pretends to know? Can you name any document in which a committee of Congress or the Interstate Commerce Commission or any other agency of the law has set forth any such program? You and I are perfectly sure that nothing of the kind exists. Nothing of the kind can exist under present conditions.

Congress in the Transportation Act of 1920 took a long step in advance. It was a revolution, because it involved a change in conception. This new conception is that this Interstate Commerce Commission shall have responsibility for authorizing rates high enough to assure efficiency and a railway income sufficient to attract adequate capital. It is only a beginning. If you need evidence of this remind yourself that under that Act the Constitution is limited to sanction all rates which will yield 6 per cent, whereas no railroad at the present time can get money at less than 7 or 8 and some of the most powerful governments of the world are paying an equivalent of 9 per cent or more.

For a Business Basis

The detail of the constructive program is for specialists. The grasping of the conception and the conversion of our political servants to it is for you and me—and that conception is that you can no more meet in transportation the demands which will be made upon you in future without a program drawn up in advance and its foundation laid in right conditions than you manufacturers can deliver production in 1922 without the requisite preparation in 1920 and 1921.

The sermon can be summed up in a golden text:

Transportation is a business. It is the business of business men to put the transportation business on a business basis. Let us get to business with a business program for transportation.

A. R. A. Organizes Joint Committee on Automatic Train Control

A JOINT COMMITTEE on Automatic Train Control was recently appointed by President R. H. Aishton, of the American Railway Association. This committee held a meeting in New York on October 20, at which C. E. Denney, vice-president and general manager of the New York, Chicago & St. Louis, was elected chairman. The several divisions of the committee elected the following vice-chairmen; T. H. Beacom, vice-president and general manager, Chicago, Rock Island & Pacific; A. M. Burt, assistant to the operating vice-president, Northern Pacific; W. J. Eck, signal and electrical superintendent, Southern; and J. T. Wallis, chief of motive power, Pennsylvania System.

The chairman of the joint committee, together with the vice-chairman of each division, will constitute a conference committee for conferences with the Interstate Commerce Commission. The duties of the joint committee are as follows:

(a) Prescribe rules and requirements for tests of automatic train control devices.

(b) Review the work already done by previous committees in the testing of appliances and bring the work up to date.

(c) Confer with representatives of the Interstate Commerce Commission in the consideration of this subject.

(d) Arrange with the carriers for practical tests as may seem advisable, and arrange for the terms and conditions of such tests.

(e) Arrange for necessary record of performances and cost of installation and maintenance and comparisons.

(f) Co-ordinate their work at all times with that of the representatives of the Interstate Commerce Commission and work in co-operation with such representatives.

A meeting of the joint committee will be held in Washington on November 5. The personnel of the joint committee is as follows:

OPERATING DIVISION

M. S. Connors, general manager, Hocking Valley, representing Eastern territory.
A. Price, general manager, Canadian Pacific, representing Canadian territory.
B. R. Pollock, vice-president and general manager, Boston & Maine, representing New England territory.
C. E. Denney, vice-president and general manager, New York, Chicago & St. Louis, representing Eastern territory.
T. H. Beacom, vice-president and general manager, Chicago, Rock Island & Pacific, representing Western territory.

ENGINEERING DIVISION

H. R. Safford, assistant to the president, Chicago, Burlington & Quincy, representing Western territory.
E. B. Katte, chief engineer, electric traction, New York Central, representing Eastern territory.
W. P. Wiltsee, assistant engineer, Norfolk & Western, representing Southern territory.
F. Ringer, chief engineer, Missouri, Kansas & Texas, representing Southwestern territory.
A. M. Burt, assistant to the operating vice-president, Northern Pacific, representing Western territory.

SIGNAL SECTION

C. H. Morrison, signal engineer, New York, New Haven & Hartford, representing New England territory.
J. A. Peabody, signal engineer, Chicago & North Western, representing Western territory.
W. J. Eck, signal and electrical superintendent, Southern, representing Southern territory.
T. S. Stevens, signal engineer system, Atchison, Topeka & Santa Fe, representing Western territory.
F. P. Patenall, signal engineer, Baltimore & Ohio, representing Eastern territory.

MECHANICAL DIVISION

J. T. Wallis, chief of motive power, Pennsylvania System, representing Eastern territory.
R. W. Bell, general superintendent motive power, Illinois Central, representing Western territory.
G. McCormick, general superintendent motive power, Southern Pacific, representing Western territory.
C. F. Giles, superintendent of machinery, Louisville & Nashville, representing Southern territory.
W. H. Sample, general superintendent motive power, and car department, Grand Trunk, representing Canadian territory.

Advantages of Steam and Electric Locomotives

Advocates of Two Kinds of Motive Power Each Endeavor to Prove Superiority

THE merits of steam and electric locomotives were propounded by their exponents at a joint meeting of the New York Section of the American Institute of Electrical Engineers, the Metropolitan Section of the American Society of Mechanical Engineers and the Railroad Section of the American Society of Mechanical Engineers held on October 22 in the Engineering Societies Building, New York. E. B. Katte, chief engineer, electric traction, New York Central, presided, and the meeting was opened by F. J. Sprague, Sprague Safety Control and Signal Corporation. One paper on steam locomotives and two papers on electric locomotives were presented and the papers were discussed by several railroad and railroad supply men.

Mr. Sprague outlined the history of the development of electric traction from the advent of the New York Elevated and the original Richmond street railway up to the present time as it is applied to trunk line electrification. He compared the inherent characteristics of the two types of locomotives, stating that while the one was a moving power plant, the other was but a transformer of energy and was, therefore, capable of much greater capacity.

The following are abstracts of the three principal papers and the discussion:

Advantages of Electric Locomotives Have Been Greatly Overstated

By John E. Muhlfeld
Railway and Industrial Engineers, Inc.

Today, in consideration of the existing rates and regulations as established by the Interstate Commerce Commission, the minimum fixed charge and the maximum operating and maintenance economy will be required on every railroad, if the stock owners are to receive even a reasonable return on their investments.

In the protection and control of railroad net earnings, one of the most important factors is the kind of motive power to be used. Unfortunately, in making comparisons of the relative values of steam and electric railway power, some of the electrical engineers have frequently given out such attractive loose figures that railway managers and their engineers have often been misled into making recommendations that have later resulted in embarrassment. For example, comparisons have been made between the operations of new up-to-date electric and of obsolete steam installations. Also assumptions have been made of extraordinary steam locomotive stand-by fuel losses, and of like erroneous factors.

While there is much existing steam road trackage that can and should receive first consideration as regards electrification for the purpose of eliminating gases from underground terminals and to give relief to terminal or line traffic congestion in the vicinity of large commercial and industrial centers, it would be financial suicide to electrify immediately adjacent connecting and intermediate mileage, particularly in view of the improvements that can be made in both existing and new steam locomotives in increasing general efficiency and economy in operation and maintenance.

Before the electric locomotive can be made permissible for general application the electrical engineer must reduce first costs; promote interchangeability; provide a motor which will efficiently, economically and flexibly cover a wide range of speeds and not break down or deteriorate from overloading and heating; reduce complication, wear and corrosion in transmission and contact line apparatus; and substantially reduce the current losses between the point of power production and the locomotive drawbar. Likewise, the steam railway mechanical engineers, locomotive builders and specialty manufacturers, if they are to guard the steam locomotive and continue it in its present field of usefulness, must become more active in modernization and bring about improvements that will substantially increase its capacity and thermal efficiency by the use of higher steam pressures and superheat; compounding; more efficient methods of combustion; utilization of waste exhaust steam and products of combustion heat; better distribution and use of live steam; reduction of dynamic weights; greater percentage of adhesive to total weight and a lower factor of adhesion; and by a substantial reduction in standby losses.

In order to determine the relative advantages of modern steam and electric locomotives the following may be stated as important items for consideration.

Financing. Few if any existing steam roads can justify or stand the additional capital investment required per mile of road for electrification, except for short distances under very special conditions such as prevailed on the Norfolk & Western, where the ventilation and 1.5 per cent. grade of a 5/8-mile single-track tunnel restricted the train movements to six miles per hour on a congested traffic section of the main line, and even then only providing the fixed charges and operating expenses are not too excessive.

The immediate requirements of new money for the more urgent steam equipment and facilities needed to provide adequate, safe and expeditious rather than luxurious service in the regeneration of the railroads, is the obvious reason for the continued utilization of the over-all more economical steam operation, and only after the possibilities in this direction have been realized can any serious financial consideration be given to the proposed radical change to super-electrification.

Adaptability to Existing Trackage and Facilities. First and foremost in the advantages of a continuation of the existing improved steam locomotive for all purposes for which it is permissible, is its flexibility and adaptability to existing railroad trackage and terminal and operating facilities, and the relatively low first cost at which it can be purchased per unit of power developed for the movement of traffic.

Effectiveness in Increasing Track Capacity. Without a doubt, electrification increases the capacity of a terminal. As already set forth, special line conditions may make electrification advisable for short distances, but results do not justify the frequent reference by electrical engineers to the weakness of steam locomotive haulage during the unprecedented cold weather in the winter of 1917-18, in that electrification would not have obviated the difficulty. If so, why did the New Haven not operate at 100 per cent. of its capacity, over its electrified zone at that time? If short of locomotives or motor cars the New York Central had plenty of surplus that was not in use and which could not be utilized outside of its electric zone, where it was badly needed. The probable answer is lack of interchangeability, which is still one of the most discouraging operating factors involved in any electrification scheme.

Furthermore, in the handling of heavy tonnage trains by the unlimited combining of electric locomotive units, the factors of peak load, transmission lines, and power plant capacity must all be considered, with the probability that permissible modern steam locomotive train units can be

more economically handled over dense traffic lines than the electric multiple unit super-trains. Although under the multiple unit system locomotive and train operation it is theoretically possible to provide unlimited sustained hauling capacity, at the head of the train, the tonnage to be handled without rear end or intermediate helpers is limited by the ability of the draft rigging on the cars to withstand the pull and shock, and this limitation can be readily met and exceeded in steam locomotive design and operation.

Train Speeds. The average freight car is in main line movement only about 10 per cent. of its life, or 2 hr. and 24 min. out of each 24 hr. Therefore, increasing train speeds beyond established economic limits at the sacrifice of tonnage, and with an increase in fuel, track and equipment upkeep and danger of operation is not the solution of the freight traffic problem. Capital expenditures applied to the reduction of those delays which now involve over 21½ hr. per day, or about 90 per cent. of the life of the car, would give much more effective and economical results.

Fuel Consumption. Great economy in fuel consumption and cost is the principal claim for electrification and recently electrical engineers have advanced the theory that it would be possible to save at least two-thirds of the coal consumed by the existing steam locomotives and that the useful carrying capacity of existing trackage could be increased about 10 per cent. by the elimination of company coal movement, if electric locomotives were substituted.

The basis for arriving at these comparative figures is so obviously ridiculous that they warrant comment only for the reason of the general publicity given. For example, for the steam operation a coal rate of 12.75 lb. per kilowatt-hour of useful work done, as measured at the driving wheel treads, or 7 lb. per kilowatt-hour (including transmission and conversion losses inherent to electrical operation) as measured at a central power station, were based on tests made in 1910 on the C. M. & St. P. of some probably long since antiquated types of saturated steam locomotives. For the electrical operation a modernized central power station coal rate of 2½ lb. per kilowatt-hour in combination with a 40-watt-hour rate at the point of delivery of the power to the railroad system for moving a gross ton-mile of passenger and freight train, was used, which would produce a movement of 1,000 average gross ton-miles for 100 lb. of coal of about 12,000 b.t.u. value per pound as fired. In arriving at these data apparently factors were overlooked or disregarded, such as gradient and curvature, drifting train mileage, human element, the past ten years' improvement in steam locomotive boilers and machinery, that central power stations cannot be regulated to a basis of 50 per cent. average load factor; and many others.

However, accepting the assertion that the proposed electrification will produce 1,000 gross ton-miles for an average of 40 kilowatt-hours, or 100 lb. of 12,000 b.t.u. coal, as stated and generally approved by electrical engineers, what can the modern steam locomotive do to justify its existence? The following results of dynamometer car tests made during 1918 may be of interest. The steam locomotives tested were of the ordinary superheated Mikado freight type. One locomotive was fitted for hand firing and burning coal on grates, while another was equipped with the "Lopulco" system for burning powdered coal in suspension. The tests were made in tonnage freight service, handling from 2,400 to 2,600 tons east-bound and from 1,850 to 2,250 tons west-bound on the Santa Fe main line between Fort Madison, Iowa, and Marceline, Mo. (the profile consisting of .8 per cent. ruling grades) a distance of 112.7 miles, during March and April, 1918.

	Item	Powdered coal locomotive	Hand fired locomotive
1	Total trips run (112.7 miles each)	14	10
2	Total miles run	1,578	1,127
3	Average running time—hours	5.06	5.25
4	Average dead time—hours	1.25	1.01
5	Average total time—hours	6.31	6.26
6	Average speed, m.p.h.	22.3	21.6
7	Average trailing tonnage per train	2,278	2,283
8	Average gross 1,000 ton miles	256.5	255.4
9	Average coal per gross 1,000 ton miles	82.4	114.8
10	Average superheat—degrees Fahrenheit	223	173
11	Average coal per boiler and superheater, hp. hour.	3.74	4.99
12	Average B.t.u. per pound of coal as fired	12,025	11,160

It can be assumed from the foregoing that the average yearly performance will approximate 100 lb. of 12,000 B.t.u. coal per 1,000 gross ton-miles, or equivalent to what we are promised for the expenditure of billions of dollars of new capital, and the loss of billions of dollars' worth of investment in existing plant and equipment to inaugurate the comforts of electrification.

As there are now about 65,000 steam locomotives in the United States, of which probably 62,000 have simple and only 5,000 have compound cylinders, and of which total only about 25,000 are as yet equipped with superheaters, the foregoing indicates what steam locomotives fuel savings are still possible merely through the application of cross compounding or superheating, or these combined factors.

Efficiency of Locomotive Operation. The off-setting fuel and energy losses, due to stand-by losses in the steam operation, and decrease in efficiency on account of fluctuating loads in the electric operation must not be lost sight of. Neither should those incident to the transforming, transmission and conversion of electric current and like factors be neglected.

It is unquestionably true that when operating under ideal fixed load conditions, the central power station, either hydro-electric or steam, can produce a horsepower with less initial energy input than is possible on a steam locomotive. It is also true that the stand-by losses on existing steam locomotives are, in ordinary practice, a serious proportion of the total fuel consumption, but it is likewise a fact that the majority of these can be substantially reduced if not entirely overcome, by modernizing the present equipment and improving maintenance and operation which would then rob the electrical engineers of their main argument in favor of a blanket electrification.

While the electrical engineers and manufacturers in this country deserve great credit for the progress made in the development of the electric locomotive, they have as yet been unable to design one which can operate at maximum efficiency throughout its range of load. The point of maximum efficiency being well established and fixed, and the current curve on an electric motor not being flat, any over- or under-load from the predetermined maximum efficiency load increased the current consumption. Furthermore, when, on account of transportation conditions, a motor is required to carry an overload for periods of five or six hours, it either breaks down, due to heating, or otherwise requires special power-consuming auxiliaries or long rest periods for the dissipation of the heat stored within itself due to the resistance of the current through the wiring, to permit of continuous operation.

Furthermore, to produce, at various hydro-electric or steam power plants, electric current at say 6,600 volts ac., step the current up to 100,000 volts ac., connect and transmit it from 100 to 300 miles through transmission lines to switching sub-stations located approximately 50 miles apart, step down to 2,300 volts ac., and then convert into direct current at say 3,000 volts for locomotive use, involves expensive lines, plants and equipment, as well as tremendous losses from the generator at the central power station to the bus bar on the direct current side of the transformer, where the current is usually metered for billing. Also the secondary system, as well as the losses through the motors and the machine friction of the electric locomotive itself, are responsible for further losses in current, all of which, after allowing for, say 10 per cent. regeneration, not only limit the capacity of the electric zone but also materially increase the arbitrary electric costs usually considered, so that it is safe

to say that the actual dead loss in power from the central power station to the electric locomotive drawbar will be not less than 50 per cent.

The number of factors entering into an analysis of the net thermal efficiency of the electric locomotive, in terms of drawbar pull, are so many as to make it impossible with the lack of dynamometer car and laboratory test data, to arrive at a figure which is not based on a number of assumptions; but as a matter of interest, assuming, that *all of the factors are affected equally* in the electric locomotive, the net thermal efficiency at the drawbar, when taking into consideration the boiler, engine, generator, step-up transformer, ac. transmission, step-down transformer, ac-dc converter, dc transmission, motors and machine efficiencies may, as representative of average existing practice, be taken as shown in Table I.

TABLE I—COMPARATIVE EFFICIENCIES OF ELECTRIC AND STEAM LOCOMOTIVES

ELECTRIC EQUIPMENT

Equipment	Efficiency factors and net thermal efficiency, per cent	Load rating, per cent 100	75	50
Boiler	Factor	.....	.....	.....
	Efficiency	76.7	76	72
Engine	Factor	18.25	18.29	19.17
	Efficiency	14	13.9	13.8
Generator	Factor	90	89.5	86
	Efficiency	12.6	12.44	11.88
Transformer, step-up	Factor	98	96	90
	Efficiency	12.34	11.93	10.67
Transmission, AC	Factor	90	95	97
	Efficiency	11.10	11.32	10.34
Transformer, step-down	Factor	98	96	90
	Efficiency	10.87	10.85	9.30
Converter, AC to DC	Factor	80	75	63
	Efficiency	8.69	8.13	3.85
Distribution, DC	Factor	90	95	97
	Efficiency	7.82	7.71	5.66
Motors, DC	Factor	91.5	90.8	89.5
	Efficiency	7.15	7.00	5.05
Machine efficiency	Factor	81	85	90
	Efficiency	5.79	5.95	4.54

STEAM LOCOMOTIVE

Equipment	Superheated or saturated	Efficiency factors and net thermal efficiency, per cent	Load rating, per cent 100	75	50
Boiler	Superheated	Factor	.....	.....	.....
		Efficiency	42.7	54.9	65.9
	Saturated	Factor	.....	.....	.....
		Efficiency	45.0	57.4	70.0
Cylinders	Superheated	Factor	11.9	11.0	10.5
		Efficiency	5.08	6.04	6.92
	Saturated	Factor	7.8	8.4	7.8
		Efficiency	3.51	4.82	5.46
Machine	Superheated	Factor	75	80	85
		Efficiency	3.85	4.83	5.88
	Saturated	Factor	77	80	82
		Efficiency	2.70	3.86	4.47

Comparing the electric and steam locomotive figures as illustrated, the relative percentage of power delivered at the track rails to 100 per cent. B.t.u. in the coal would be:

Kind of locomotive	Net thermal efficiency at load ratings of 100 per cent	75 per cent	50 per cent
Electric	5.79	5.95	4.54
Steam, superheated	3.85	4.83	5.88
Steam, saturated	2.70	3.86	4.47

As 100 per cent. load rating conditions would, in practice, occur only momentarily, and as the majority of the drawbar load represents from 30 to 60 per cent. of the locomotive maximum drawbar capacity, comparison should properly be made only of the net thermal efficiencies at 50 per cent. load ratings.

Various dynamometer car and laboratory test performances of representative types of steam passenger and freight locomotives confirm the foregoing figures relating to steam operation.

At speeds of from 15 to 75 miles per hour, the existing superheated steam locomotive thermal efficiency actually ranges from 5.3 to 8.1 per cent. as compared with the calculated figures of from 4.83 to 5.88 per cent. for 75 and 50 per cent. load ratings, respectively. Adding to this an increase of from 15 to 50 per cent in net thermal efficiency that may be produced from developments now under way, the steam locomotive of the future will be quite a respectable assembly of engineering efficiency.

Cost of Maintenance. In determining the maintenance cost of the electric locomotive the popular error is to take into account the locomotive proper, whereas a true comparison can only be made by including all corresponding elements as found in the self-contained steam locomotive which goes back to the upkeep of all facilities having to do with the utilization of the fuel or water power, including the central power station buildings, boilers, engines, conversion, transmission, distributing and contact line systems, substations, track rail bonding and insulation, electric disturbance cut-outs or neutralizers, extra expense in upkeep of the electric zone trackage, and like auxiliaries, and finally the electric locomotive itself.

Peak Load Conditions in Relation to Traffic Requirements. With the steam locomotive the traffic requirements are met by the distribution and utilization of the necessary number of self-contained motive power units as required, regardless as to the capacity of one or more central power stations or of any limitation in quantity, or in price, of the total available power output. The operation of one or of 500 steam locomotives at their maximum capacity at any given, or for any duration of time on a single division, is of no concern.

However, in order to meet the ideal conditions for electrification, the traffic should be uniformly spread or scattered over the 24 hr. period, whereas in the majority of cases train movement is based on traveling and shipping conditions and cannot be advanced or delayed in order to eliminate peak load conditions.

Rate of Acceleration. In order that the desired running speeds can be reached in the minimum of time after the starting of trains, the ability of a locomotive to accelerate its load rapidly is of considerable importance, and in this respect the electric power has had the advantage. The steam locomotive engineer has, however, not lost sight of this fact, and improvements already made in boiler and cylinder horsepower ratios, as well as developments now undergoing for the utilization of existing non-productive adhesive weight and to increase the coefficient of friction between the propelling wheels and the track rails will enable the steam locomotive to duplicate the performance of its electric competitor in this regard.

While the regenerative system of braking can no doubt be developed to the point where it can be safely used in view of the recent serious accident on the St. Paul, due to the failure of the regenerative brake control, just what economy will result is problematical. When the power so generated cannot be directly used by another pulling locomotive on the line, it must be otherwise absorbed, and it remains for the electrical engineers to prove just how much of it is lost in conversion or by absorption, and the resulting net gain as compared with the investment, fixed charge and upkeep and operating cost for the equipment involved.

Effect of Weather Conditions. Even though the full steaming capacity, horsepower and drawbar pull of a modern steam locomotive can be developed during cold weather conditions, there are the factors of radiation and freezing to be reckoned with, which gives the electric locomotive the advantage in winter, particularly, as its effectiveness is greater on account of the lesser tendency for the motors to overheat. This winter advantage, however, is largely overbalanced during the summer, when the main motors heat, especially under overloads, and require cooling at terminals or otherwise overheat, and result in insulation break-downs or burn-outs, or other troubles.

Road Delays and Tie-Ups. While the electric locomotive has the advantage of not being required to take on fuel and water, except for the operation of steam heating equipment for passenger trains, with the increased capacity of the modern steam locomotive tenders, and the lower water and

fuel rates per drawbar horsepower developed, the delays due to taking on these supplies have been greatly reduced and need not be serious.

Barring collisions, wrecks and like accidents not due to the system of motive power in use, steam operation is not susceptible to complete tie-ups, as is the case with electrification, where short circuits or failures occur, due to rains, floods, storms and like causes, and as the result of motor, wiring and insulation heating, deterioration and break-downs, as the individual mobility of each piece of motive power without regard to any outside source of power enables quick relief.

Terminal Delays. The examination of reports of a dense heavy freight traffic railroad in the Eastern District shows the time of its steam locomotive for a recent two months' period, distributed as follows:

1—In road service	50 per cent of total time
2—At terminals waiting trains and otherwise in hands of transportation department	26.4 per cent of total time
3—At terminals in hands of mechanical department	23.6 per cent of total time

There is no doubt that the electric has an advantage over the steam locomotive as regards time required for periodical boiler work, fire cleaning and rebuilding, fueling and watering, except where fuel oil is used, but where terminal delays occur due to waiting for trains, such as the foregoing statement set forth, the time required for such work does not become an expensive determining factor in the daily average miles to be obtained per locomotive. Also the fact that the electric locomotive, cannot, without terminal rest periods or without the consumption of power to operate auxiliaries, operate at its maximum capacity must not be overlooked. Furthermore, many improvements in the fuel and ash-handling and combustion equipment of the steam locomotive using coal are now in process and terminal delays due to these causes are annually being reduced by improved means and methods.

Hazards. With the establishing of more scientific and careful methods of designing, testing and inspection, and the more extended use of safety appliances, the failures of steam locomotive boilers and machinery, particularly those resulting in personal injury, are relatively low as compared with the work performed. It is, therefore, doubtful if there is any greater proportion of risk from the steam locomotive in that regard than from electrocution and other attendant dangers from high-voltage electrification.

Fourteen Points for Electrification

By A. H. Armstrong

Chairman Electrification Committee, General Electric Company

Accepting the Mikado and Mallet as the highest developments of steam road and helper engines for freight service, the following general comparison is drawn with an electric locomotive that it is entirely practicable to build without in any respect going beyond the experience embodied in locomotives now operating successfully.

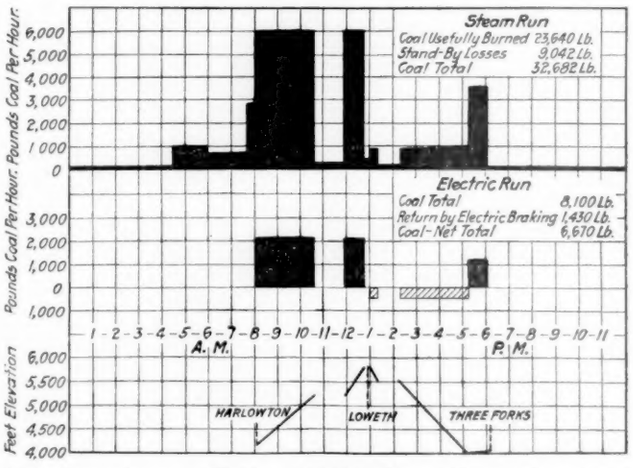
Comparison Steam and Electric Locomotives

Type	Mikado 2-8-2	Mallet 2-8-8-2	Electric 6-8-8-6
Weight per driving axle	60,000 lb.	60,000 lb.	60,000 lb.
Number driving axles	4	8	12
Total weight on drivers	240,000 lb.	480,000 lb.	720,000 lb.
Total weight, loco. and tender.	480,000 lb.	800,000 lb.	780,000 lb.
Trac. eff. at 18 per cent coef.	43,200 lb.	86,400 lb.	129,600 lb.
Gross tons 2 per cent grade	940	1,880	2,820
Trailing tons, 2 per cent grade.	693	1,495	2,430
Speed on 2 per cent grade	14 m.p.h	9 m. p.h	16 m.p.h
H.P. at driver rims	1,620	2,080	5,570
I.H.P. at 80 per cent eff.	2,030	2,600	.....
Trailing ton-miles per hour on 2 per cent gradient	9,700	13,500	38,800

The above analysis brings out the fact that to equal the hourly ton-mile performance of one electric locomotive it would require three and four engine crews, respectively, for the Mallet and Mikado types. In view of the facts, it is a modest claim to make, therefore, that the daily tonnage capacity of single-track mountain grade divisions will be increased fully 50 per cent over possible steam engine performance by the adoption of the electric locomotive.

Regenerative Braking

The hazard of mountain operation is greatest on down grades, although the perfection of automatic air brakes has done much to modify its dangers. It is left to electricity, however, to add the completing touch to the safe control of descending trains by supplying regenerative electric braking. Not only are air brakes entirely relieved and held in reserve by this device, but the potential energy in the descending train is actually converted into electricity, which is transmitted through the trolley to the aid of the nearest train demanding power.



Coal Record on a Basis of 1000 Gross Tons Moved for Steam and Electric Runs from Harlowton to Three Forks, Mont.

The heat now wasted in raising brake shoes and wheel rims often to a red heat is returned to the trolley system and becomes an asset instead of a likely cause of derailment.

Cost of Maintenance

Probably in no one respect does the electric locomotive show greater advantage over the steam engine than in cost of maintenance.

Including all engine service charges, the facts available give foundation for the claim that electric locomotives of the largest type can be maintained for 25 to 30 per cent of the upkeep cost of steam engines operating in similar service.

Fuel Saving

Much has been written on the subject of fuel saving effected by steam railway electrification. The estimates of electric engineers have been called extravagant by steam engine advocates, who in turn have been charged with an incomplete knowledge of all the facts available. Fuel economy figured prominently among the several reasons leading up to the replacement of the steam engine on the Chicago, Milwaukee and St. Paul Railway as brought out by a careful analysis of the performance of the steam engines then in service. The results of the many tests are doubly interesting when compared with the daily performance of the present electric locomotives now running over the same tracks and operated in some instances by the same engine crews. Although the steam engines tested may now perhaps be considered obsolete and not within the scope of this discussion of the modern engine, nevertheless it is not without value to compare the results of steam and electric locomotives operating over such long distances under identical conditions.

The following data is, therefore, submitted as applying to a particular equipment only. No claim is made that it is representative of the best modern steam engine performance, although many thousands of steam engines still in operation will show no greater economies than those given in the following table. The general data applying to the steam and electric locomotives tested are as follows:

C. M. & St. P. Tests—Locomotive Data

	Steam	Electric
Type	2-6-2	4-4-4-4-4-4
Weight of engine	206,000 lb.	568,000 lb.
Weight of tender	154,000 lb.	.....
Weight, total engine and tender	360,000 lb.	568,000 lb.
Weight on drivers	152,000 lb.	450,000 lb.
Ratio driver weight to total	42.2 per cent	79.3 per cent
Rigid wheel base	13 ft.	10 ft. 6 in.
Diameter, drivers	63 in.	52 in.
Cylinders	21"x28"	.....
Heating surface	200 lb.	.....
Heating hurface	2,346 s. ft.	.....
Grate area	45 sq. ft.	.....
Water capacity	8,000 gal.	.....
Coal capacity	14 tons	.....

The run of 111.1 miles from Harlowton, elevation 4,162 ft., to Three Forks, elevation 4,066 ft., over the Belt Mountain Divide at Loweth, elevation 5,789 ft., was made by steam with 871 tons trailing in 26 cars, and by electric locomotive hauling 64 cars weighing 2,762 tons. In order to picture a direct comparison of the results of the steam and electric runs, all test data is reduced to a common basis of 1,000 gross tons moved, this unit of measurement including the locomotive and tender weight. The running speed of the electric train was but slightly higher than the steam, and the additional correction in the power demand rate of the former is made proportional to the lower speed. Both runs are, therefore, shown as made in identical time on the basis of 1,000 total gross tons moved in each instance. The fuel furnishing power to the steam train was coal, having the following analysis:

Coal Analysis

Fixed carbon	Volatile Carbon	Ash	Moisture	B. T. U's.
47.99	38.98	8.35	4.68	11,793

Electric power was furnished by water, and hence no direct coal equivalent is provided by the test result. To afford a common basis of comparison, however, a single assumption seems permissible and a rate or 2½ lb. of coal per kilowatt hour is taken as representative of fair electric power station practice. Coal burned under the steam engine boiler was determined by weighing at the end of the run and by detailed record of scoops en route. Power input to the electric locomotive was obtained by carefully calibrated recording watt meters as well as curve drawing volt and ampere meters. These values of locomotive input were raised to the value of three-phase power purchased in the ratio of 68 per cent given by R. Beeuwkes in his A. I. E. F. paper of July 21, 1920, and the kilowatt hours so obtained reduced to coal equivalent in the ratio of 2½ lb. coal per kw. hr.

To assist in arriving at a truer comparison of modern steam and electric locomotive operation, a further analysis of the above test is enlightening. The commonly used unit measurement of pounds of coal per 1,000 ten-miles is at best a very rough and unstable comparison of steam engine runs over different profiles, variable quality of fuel and operating conditions. For illustration, the following data may apply.

Pounds Coal Per 1,000 Ton-Miles

	2 Per cent grade	Level track
H.P. hours at driver rims	123	18.8
Indicated H.P. hours at 80 per cent eff	154	23.5
Lb. water per I.H.P. hour	20	16.
Lb. water per lb .of coal	5	8.
Lb. coal per I.H.P. hour	3.33	2.0
Lb. coal per 1,000 ton-miles	513	47.
Lb. coal per 1,000 T.M. trailing	650	50.5

Pounds coal per gross 1,000 ton-miles may thus vary from 650 to 50.5, according to gradient and with no standby losses whatever included. The boiler must be kept hot at all times, however, and fully 33 per cent can safely be added to the above figures to include the inevitable standby losses inherent to steam engine operation. Except over very long runs with terminals at the same elevation it seems hardly possible, therefore, to accurately compare engine performance over different profiles by such a variable unit as pounds coal per 1,000 ton-miles.

A truer understanding of what takes place under the engine boiler may be shown by continuous records of coal burned, tons moved, profile, delays, etc., all reduced to pounds of coal burned per useful h.p.h. work done at the driver rims with segregation of the many standby losses.

Analysis Steam and Electric Runs, Harlowton-Three Forks

Per 1,000 tons moved

	Steam	Electric
Kw. hrs. at driver rims	2,038	2,038
H.p. hrs. at driver rims	2,625	2,625
Coal per h.p. hr. driver rims	9.02 lb.	*3.09 lb.
Credit regenerative braking	.....	.55 lb.
Standby loss, 27½ per cent	2.47 lb.	.....
Total coal per rim h.p. hr	11.49 lb.	2.54 lb.

*Measured at power house and includes locomotive losses and 32 per cent transmission and conversion loss.

Under the same conditions a modern engine would undoubtedly have consumed much less than 9.02 lb. coal (11,793 B.t.u.'s), while doing work measured at the driver rim. The addition of superheaters gives greater output and economy, while mechanical stokers add output only, and it is claimed, at some expense in economy over good hand firing. However efficient the power plant on wheels may reasonably be developed without too seriously interfering with the sole purpose of the steam engine, the hauling of trains, it can never approach the fuel economies of modern turbine generating stations. Whatever transmission and conversion losses are interposed between power house and electric locomotive are more than compensated for by the improvement in the load factor resulting from averaging the very fluctuating demands of many individual locomotives.

Theoretical Comparison, Modern Steam and Electric Locomotives, Harlowton-Three Forks

	Mikado, 2-8-2	Electric, 4-4-4-4-4-4
Type		
Weight on drivers	240,000 lb.	450,000 lb.
Weight engine and tender	480,000 lb.	568,000 lb.
Trac. eff., 18 per cent coeffi.	43,200 lb.	81,000 lb.
Trailing ton, 1 per cent grade	1,420	2,836
H.p. hrs. at driver rims	4,360	8,200
Coal per Ind. h.p. hr	3	.....
Coal per driver, h.p. hr	3.75	.....
Standby loss—test result	9,042 lb.	.....
Standby loss per h.p. hr	2.15 lb.	.....
Total coal per driver, h.p. hr	5.90 lb.	.....
Coal at power house, kw. hr	.....	2.5 lb.
Coal at power house, h.p. hr	.....	1.86 lb.
Coal at locomotive driver, h.p. hr	.....	3.09 lb.
Coal credit due regeneration	.....	.55 lb.
Net coal at driver, h.p. hr	5.90 lb	2.54 lb.
Total net coal	24,800 lb.	20,900 lb.
1,000 trailing ton-miles	157,500	314,000
Coal per 1,000 ton-miles	158 lb.	66.7 lb.
Ratio coal burned	2.37	1

The above table is based upon actual electric locomotive performance, Harlowton-Three Forks, coal taken at 2½ lb. per k.w.h. at assumed steam power station. Steam engine values are based upon the known working efficiency of a Mikado, equipped with superheaters but penalized with the same standby losses actually determined with simple engine tested Harlowton-Three Forks. A test run from Harlowton to Three Forks with a modern Mikado engine, hauling 1,420 tons, may possibly show a lower average fuel rate than 3 lb. per I.h.p.h. at drivers, less standby waste than 9,042 lb. coal, but the average annual performance of many such engines would be most excellent if it reached the net figure arrived at of 5.9 lb. coal per actual h.p.h. work performed at drivers. The electric run, however, is being duplicated daily, as to relation between kw.hs. and ton-miles, and it is just this reliability of electric operation that may at times give rise to misunderstanding in the comparison of steam and electric data.

Summary

Some of the principal advantages claimed for the electric as compared to the steam locomotive may be briefly stated as follows:

1. No structural limits restricting tractive effort and speed of electric locomotive than can be handled by one operator.
2. Practical elimination of ruling grades by reason of the enormously powerful electric locomotives available.
3. Reduction of down-grade dangers by using regenerative electric braking.
4. Very large reduction in cost of locomotive maintenance.
5. Very large saving of fuel, estimated as two-thirds the total now burned on steam engines in operation.
6. Conservation of our natural resources by utilizing water power where available.
7. Material reduction in engine and train crew expense by reason of higher speeds and greater hauling capacity.
8. Increased valuation of terminal real estate following electrification.
9. Increased reliability of operation.
10. Material reduction in operating expense due to elimination of steam engine tenders and most of the company coal movement, the two together expressed in ton-miles approximating nearly 20 per cent of present gross revenue ton mileage.
11. Large reduction in effect of climatic conditions upon train operation.
12. Postponement of immediate necessity for constructing additional tracks on congested divisions.
13. Attractive return on cost of electrification by reason of direct and indirect operating savings effected.
14. Far-reaching improvements in operation that may revolutionize present methods of steam railroading.

Electric Motive Power for Traffic Demands for Tomorrow

By F. H. Shepard

Director of Heavy Traction, Westinghouse Electric & Manufacturing Co.

The electric locomotive has generally, thus far, been a mere substtiute for the steam locomotive, although, in some cases, due to the greater power of the electric locomotives, there has been a modification of the handling of traffic.

Two conspicuous cases of this have been the Norfolk & Western and the Chicago, Milwaukee & St. Paul. In the case of the Norfolk & Western, two electrics handle the same train as was formerly handled by three Mallet engines, but at twice the speed. In this operation, owing to the great increase in hours of road service as well, one electric locomotive is the practical equivalent of four of the Mallet engines replaced.

On the Chicago, Milwaukee & St. Paul, the notable change has been the elimination of intermediate terminals on the electrified section between Harlowtown, Montana, and Avery, Idaho, 440 miles long. There is at present a single intermediate engine terminal, but the latest passenger locomotives are detached from trains at this terminal for inspection and work only, which takes place about once in each eight or ten trips. On regular schedule, these engines make a run of 440 miles each day, being taken off for inspection at Deer Lodge, after mileage varying from three to five thousand miles. On occasion, when, due to a schedule derangement, engines have been maintained in continuous road service for periods of thirty hours or more, for a full day of twenty-four hours, mileage records of up to 766 miles in this mountain service have been established. These records are truly indicative of what may be expected with electric power.

With the retirement of the lighter and weaker car equipment, a material increase in the weight of trains will be realized. Without the limitation in train speed commonly accepted as a handicap to operation of tonnage trains, who can say what the limit to train load will be with electric power? In fact, the character of railroad operation which may be secured with electric power has not yet been visualized. Every other industry that has been electrified has experienced a revolution in methods and service due to electrification. This should be equally true in the case of the movement of our railroad traffic.

Our present methods have been built up entirely under the necessities and limitations of the steam locomotive. This is evidenced by the existence of intermediate terminals at the ends of all the so-called engine districts, where all traffic halts. Again, the steam locomotive requires attention en route, needs supplies of water and coal, and, because of its slow movement when hauling our present tonnage trains, it is frequently sidetracked for superior trains, and thus there are more and still more halts to traffic.

Car inspection now takes place at the terminus of each engine district. If, under condition of electric operation, the engine district can be increased to 200, 400, or even 500 miles, is there any good reason why car inspection should not be eliminated at the present intermediate terminals? In fact, is not the general standard of maintenance of equipment of doubtful value on the present basis of inspection at each 100-mile interval? Cars in subway service, which is certainly full of potential hazard, are economically and reliably maintained through inspection at intervals of one to three thousand miles. The elimination of these intermediate terminals, with the resultant necessity of keeping the train moving on the main line, would secure an enormous increase in miles per car, with a corresponding saving in equipment.

Furthermore, with the dispatch obtained in handling trains, movement could be so marshalled and scheduled that the necessity of storing goods at terminals to protect exports and local consumption would be largely eliminated, and terminals would then become in fact, as in fiction, gateways open instead of closed.

Coming now to the comparative performance of steam and electric locomotives, it is important to bear in mind their fundamental difference, the one, a generator of power, and the other a transformer of power. The generation of power in central stations is surrounded with many refinements, and in the consumption of coal there is every opportunity for skillful handling and supervision, so that the thermal efficiency of a modern central station is relatively high and is also continuously maintained. With the steam locomotive, on the other hand, the thermal efficiency is dependent not alone upon the design of the locomotive, but the manner in which it is worked, its condition, which differs widely from the best, and finally by the skill in firing. The electric locomotive, on the other hand, consumes power only when in service, and works at any load at its designed efficiency. The average performance, in the case of the electric, approximates the maximum in efficiency, while the steam, on average performance, will differ widely therefrom.

We can, therefore, hardly expect that with the best steam locomotives the average coal consumption will be equal to twice the coal rate for the same work performed by electric locomotives with steam generated power. Obviously, with hydro-electric generation, the saving in fuel is complete. There is further economy due to the lesser work performed, because the electric locomotive does not have to trail supplies of fuel and water, nor is there need for the hauling of coal to points of local supply, which will always be greater than hauling to electric central stations.

There are a considerable number of different designs of electric locomotives all in successful operation, and each

possessing certain advantageous features. Further experience will, undoubtedly, result in the survival of common types for the different classes of service. The great latitude with which electric locomotives can be designed, while fundamentally most desirable, is in itself, at the present time, somewhat of a handicap. This is now the subject of intensive analysis, and this study is undoubtedly developing as well, a better knowledge of the running characteristics of the steam locomotive.

To state the case briefly, we are all interested in the transportation problem. Electrification is bound to be the most potent factor for its relief. We should, therefore, invite and embrace closest co-operation with the engineering and mechanical skill which has been so productive in the steam locomotive field.

Discussion

The discussion of the principal papers took the form of reading prepared discussions only, and due to the lateness of the hour some of these were not presented or were given in brief. No one offered to start an open discussion when it was suggested by the chairman.

Sounder Bases for Comparison Needed

H. B. Oatley, chief engineer, Locomotive Superheater Company, stated that while both electric and steam locomotives were undoubtedly able to stand on their own merits, that it was futile to discuss these merits without some idea of what the return on the capital investment will be. This was brought out in view of the difficulties encountered by the railroads in obtaining capital. Modern electric locomotives, he said, must be compared with modern steam locomotives, the stand-by fuel losses of steam locomotives should be compared with similar losses in the power plant, and losses inherent to the transmission and transformation of electric power and costs of steam engines, roundhouses, coaling and water facilities, etc., compared with costs of electric locomotives with the necessary powerhouses, transmission lines, sub-stations and distribution systems.

Adoption of Electric Traction Has Been Slow

The high points of the discussion presented by F. J. Cole, chief consulting engineer, American Locomotive Company, are summed up in the following: In the 27 years since the building of the first electric locomotive for operation of the tunnel into Baltimore, only about one per cent. of the steam locomotives in this country have been superseded by electrics. Advocates of electric traction fail to produce complete financial statements of installations made. Many ill-considered electric suburban lines have been abandoned. Electrically operated roads must have a large excess of power-station capacity. A steam locomotive is a more flexible unit than an electric locomotive, and a steam-operated road is not subject to tie-ups due to burned-out cables, blow-outs, etc. Much of the fuel economy claims made for electric operation are based on unwarranted assumptions.

Railroad Facilities Must Keep Pace With Development of Nation

The thought was brought out by C. H. Quinn, chief electrical engineer (N. & W.), that if we are to maintain our standing in the commercial world, our railroad facilities must go forward and keep pace with the commercial development of the nation, and that for this reason effort should be concentrated on the development of freight locomotives which can meet coming requirements. Freight car capacities, he showed, have increased 100 per cent. during the past ten years, while steam locomotive capacities have increased only 10 per cent. By comparing fuel consumption of the electrified division of the Norfolk & Western with tests made on modernized Mallet engines under similar operating conditions, Mr. Quinn showed a fuel saving of 29.3 per cent. in favor of electric operation. In answer to a query on regenerative braking, it was pointed out that during the past five years twenty thousand 3,250-ton trains have been taken down a 2.3 per cent. grade, using only regenerative braking, without a single failure.

Fuel Economy on the New Haven

A. L. Ralston, mechanical superintendent (N. Y., N. H. & H.), compared the thermal efficiency of the 3,000-volt direct current system with the efficiency of the electric locomotive as given in Mr. Mühlfeld's paper. It is stated that on the New Haven, the efficiency at full load was 8 per cent; at 75 per cent load, 7.8 per cent; and at 50 per cent, 7.4 per cent. To prove greater reliability of electric service, he cited the fact that there was only one failure for every 21,000 miles run by electric locomotives, and a failure for every 4,000 miles run by steam locomotives. He stated that the records of the New Haven showed that in slow freight service, approximately 25 kw. hours were consumed per 1,000 gross ton miles in freight service. The coal per kw. hour averaged 2.92 lb., and the line loss was 7.1 per cent. The fuel consumption in passenger service was 9.3 lb. per car mile on the electric division, while the average for steam operation on the New Haven was 19.3 lb. per car mile. With coal costing $5 a ton, the net saving through electrification was $393,000 a year.

In freight service, electric locomotives consumed 84 lb. of coal per 1,000 gross ton-miles, while steam locomotives averaged 199 lb., the saving in this service being $268,000. In switching service the consumption of electric locomotives was 38.3 lb. per mile, and for steam operation, 106.8 lb. per mile, a saving of $94,000. The electrification was, therefore, responsible for a gross saving in the cost of fuel amounting to $755,000 annually.

Electrical Exponents' Figures Do Not Agree with Facts

The discussion presented by F. H. Hardin, chief engineer of motive power (N. Y. C.), took the form of a criticism of the papers presented by Mr. Armstrong and Mr. Shepard. In determining the desirability of electrifying, he said, the matter of present costs and the situation 15 or 20 years hence are of utmost importance. Wheel and rail wear, he pointed out, must be considered as well as weight per axle and electric as well as steam locomotives must have backshop facilities. Figures shown on the maintenance costs of New York Central Mallet locomotives, including shop and enginehouse repairs, were from 24 to 37 cents per mile, as against the estimate of 60 cents offered by Mr. Armstrong, and Mikado locomotives on the N. Y. C. show a fuel consumption of 125 to 130 lb. of coal per 1,000 gross ton-miles as against the estimate made by Mr. Armstrong of 158. On speaking of Mr. Shepard's statement that electrification might quadruple the present railroad capacity, Mr. Hardin said that the electrification is only one factor, and perhaps not the greatest, of what Mr. Shepard sees in the future.

Do Not Appreciate St. Paul Conditions

R. Beeuwkes, electrical engineer (C. M. & St. P.), submitted a discussion criticising the paper presented by Mr. Mühlfeld. The nature of the more pointed criticisms were about as follows: The paper captioned "Conclusions" contains statements of so general a character as not to permit of profitable argument. The "Virginian Steam Articulated" locomotive can not justifiably be compared with the St. Paul electric locomotives, as each is designed for an entirely different service and operates under entirely different conditions. Fuel economy, while important, is hardly the most important claim for electrification, and its importance will vary in different cases. Decreased cost of engine repairs,

enginehouse expense, train and enginemen's wages and increased ton-mile capacity of locomotives are of more importance. Motors can carry overloads—exert abnormal traction efforts—for considerable periods of time without injury, whereas the steam locomotive has a well defined maximum tractive capacity depending upon the steam pressure at which it is supplied. Ease of starting trains is a feature of electrical operation which is so noticeable that even those not particularly interested in the matter note and remark about it. Starting each car successively, as spoken of in Mr. Mühlfeld's paper, does not apply in the case of a train on a mountain grade. The runway accident on the St. Paul was in no way an electrical failure.

Electric Operation Does Not Save Coal

The opinion was expressed by W. F. Kiesel, Jr., mechanical engineer of the Pennsylvania, that electric operation does not save coal, and he produced figures obtained from locomotive tests to substantiate his opinion. Referring to Mr. Armstrong's paper, he spoke as follows: "Two statements in the fuel comparison deserve some analysis. The stand-by losses for steam locomotives are given as 9,042 lb. of coal. The regenerative braking on the electric locomotive is credited with a saving of 1,430 lb. of coal. About half, or 4,595 lb. of coal, of the standby losses are for making fire and drifting, which is high. The coal used for making fire is not all loss.

He also said that, for either steam or electric operation, the length of divisions and locations of terminals are governed by other than locomotive limitations.

Ask the Man Who Owns One

W. L. Bean, assistant general mechanical superintendent, while speaking for the steam men, presented an unbiased discussion based largely on his own experience. The following is an abstract of his remarks:

It must be conceded broadly that electrical operation requires less coal per unit of traffic handled than steam operation. How much less depends on the specific conditions.

Likewise, the mileage per unit of electric equipment is ordinarily greater per unit of time. On one largely electrified road, express locomotives average 27 per cent more miles per day per locomotive owned than steam power in similar service. However, the first cost of the electric engines per unit of capacity was 84 per cent greater than in the case of steam. Therefore, the fixed charges are greater for the electric engine per unit of service.

A few words respecting comparative flexibility, especially in service of a character which demands it, may be of interest. A certain modern passenger electric locomotive will handle a heavy train of Pullmans at high speed on a through run with a few stops such as would require a modern Pacific type steam engine of about 43,000 lb. tractive effort. However, to operate the electric engine in heavy local service over the same distance is impossible because of the heating caused by frequent starting. In such service, the maximum train which can be handled by the electric locomotive can only approximate what can be handled by a steam engine of about 30,000 pounds tractive effort.

Regarding the design of the machinery of a steam locomotive being utterly circumscribed by the necessity for tying it up to a steam boiler, the statement can be made that some modern high powered electric locomotives are so compact with apparatus, both inside the cabs and beneath, as well as on top, that additions to or enlargements of details, even of a minor nature, are well nigh impossible. Furthermore, this is not peculiar to AC-DC machines.

When one comes to attempting the solution of the problems attendant on the heating of passenger trains, electrically drawn; to find room for the boiler, water and fuel oil storage, auxiliaries, etc., and keep within weight limitations, the difficulties are very real and certainly lead one to the conclusion that on electric passenger power the boiler is circumscribed by electrical apparatus.

In surveying electrification broadly, one finds there is a vast field of opinion among electrical engineers as to types of installations. Is it possible that by so many widely divergent electrical means the final net results are always to the discredit of steam operation? Can any type of electrical layout beat steam? Even if so, it is hardly probable that each electrical arrangement can be as good as every other one.

It appears that when a railroad goes in for electrification, it must settle on some type of layout the main characteristics of which are fixed. Extension must either be along the original plan as to power characteristics, distribution or collector apparatus, or else vast sums must be spent to re-vamp the existing plant if the new lay-out is not to be largely separate and independent with all of the inherent disadvantages of non-interchangeability and lack of flexibility.

The design and operating characteristics of steam power have developed far more along lines of possible common usage and practice. It is to be hoped that the lines of development of electrical facilities will tend to converge rather than diverge too widely.

Some reasons for such desirability are:

(a) Railroad managements will not be so fearful of becoming tied up with a heavy and inflexible type of investment, which may quickly become obsolete through not lending itself reasonably well to extension or modernization.

(b) The need for a broader field of design and manufacture of equipment and the furnishing of repair parts for the same.

Possibilities of Electrification Should Be Investigated Thoroughly

George Gibbs, chief engineer electric traction, Long Island, stated that, as regards simplicity, the self-contained steam locomotive has an inherent advantage over the combination of elements required for electric propulsion, and the latter must show some peculiar advantages in an operating, rather than a structural sense, if it is to supersede steam traction. Due to the large investment in steam locomotive equipment, he said that in any event steam motive power can be displaced only by slow degrees and railway men can discuss the new rival with calmness. After presenting a general picture of the situation, Mr. Gibbs concluded by saying that the available facts indicate the importance of carefully investigating each proposed application to insure that it is properly conceived and carried out.

Carefully Correlated Data Is Needed

The discussion prepared and submitted by E. B. Katte, chief engineer electric traction, (N. Y. C.), expressed the opinion that too much has been claimed for the steam locomotive as well as for the locomotive operated by electricity. Without doubt, he said, there are advantages peculiar to each, but it will always rest with the railroad engineer to determine and decide which type of locomotive will be best suited to the peculiar conditions surrounding the railroad which he serves. He produced a table which showed that fuel consumption data is apt to be misleading insofar as comparisons are concerned, due to widely different conditions on the various roads in question. He concluded his remarks as follows: "Finally, too much reliance should not be placed on results obtained from test runs, even if they fairly well simulate actual conditions. To be of comparative value, service records should extend over several years, and the data should be carefully collected, correlated and averaged to give results that may be expected in everyday operation."

Short Lines Contest Employees' Wage Demand

Representatives of Class II and III Carriers Testify Before the Railroad Labor Board at Chicago

THE OPENING SESSIONS of the United States Railroad Labor Board's public hearings upon the demand of employees of short line railroads for the extension of the wage scales created by the Board's award of July 20 were described in the *Railway Age* of October 22, (page 698). As stated in the closing paragraphs of that article, the real fight before the Board began on October 21 following the completion of hearings as to the jurisdiction of the Board over various electrically-operated interurban roads. It was agreed early in the hearings that testimony concerning the jurisdiction awarded the Board by the terms of the Transportation Act would first be taken, following which the dispute between the short lines and their employees would be considered.

Insofar as the testimony of the representatives of the various short lines is concerned, there has been little variation. Each representative has outlined the physical characteristics, financial position, traffic movements, and operation of his line either in the form of a statement or in answer to questions. All have opposed the granting of increased wages from the standpoint of practically every condition upon which the Transportation Act states that the Board should base its awards. The outstanding features of the hearings so far have been the general statements which have been made by representatives of the American Short Line Railroad Association.

On Thursday morning B. M. Jewell, representing the associated standard recognized railroad labor organizations, presented the employees' side of this controversy by suggesting to the Board that the testimony presented by representatives of the employees in the hearings which terminated with the award of July 20 be accepted as their testimony in this case. He added that the increases requested of the short lines should be based on the rates paid under General Order 27 and supplements thereto, whether or not the individual lines have already applied these wage scales.

Bird M. Robinson, president of the American Short Line Railroad Association, and representing many of the short lines, in presenting their side of the controversy, not only vigorously opposed the granting of increased wages to the employees, but denounced the manner in which this dispute was brought before the Board. Mr. Robinson said in part:

The first question we shall present for consideration of the Board is whether or not there is such a dispute as the law contemplates and must be decided by the Board. In order that there may be no possible misunderstanding as to the attitude of the short line railroads we declare that in every case which we represent where a genuine dispute between a short line railroad and its employees is brought before this Board in the manner provided by law, such railroad is willing that such dispute shall be decided by this Board; but we emphatically condemn and protest against machine made or manufactured disputes.

The Transportation Act of 1920 creates this Board and confers such jurisdiction and power as it may exercise. That Act provides an orderly and peaceful method for the settlement of labor disputes. It was intended that the tribunal therein provided should hear and decide disputes between carriers and their employees, but it was never intended that they should be placed in the attitude of mere moot courts to decide questions which did not originate with the employees, but which, in fact, originated with and are the creations of persons who have no direct interest in the questions thus presented.

We expect to be able to show this Board that in most, if not in every case where complaint has thus far been filed against a short line railroad, there is no genuine dispute between such road and its employees. We take the position that a demand which did not originate with the employees, but is made under orders or instructions from officers of grand or general organizations where their general membership is not directly connected with the particular road, is not the demand of employees, but is in truth and fact a demand of the general officers of organized labor. This does not mean that such general officers may not act for and represent the employees before this Board; but it does mean that a case brought before this Board by grand officers who originated demands and had the employees present them through control over them as members of organized labor and who prohibited employees from modifying such demand in any particular, is not a dispute, but is the ultimatum of an organization which has no interest direct in the demand it makes and is clearly in violation of the letter and spirit of the law which brought this Board into being and provides the way in which it may acquire jurisdiction.

We take the position that this Board cannot and will not act upon the appeal of any party where it appears that such party has not attempted in good faith to proceed in accordance with the spirit as well as the letter of the law. We expect to show the Board that in these cases now before it for consideration the parties who are here as complainants have utterly disregarded the procedure prescribed in the law.

In support of these contentions, Mr. Robinson presented copies of circulars and letters issued and written by labor leaders and alleged to be letters of instruction to local brotherhood leaders for bringing wage disputes properly before the Board.

Mr. Robinson continued:

It seems to us that this is the time for plain speaking. We declare to the Board that we will appear whenever cited to appear, but in any and every case where there is not at least a prima facie showing of compliance with the procedure required by the law, or in other words, where there is not a genuine dispute as to which there has been an honest effort to follow the law, we cannot and will not willingly continue a party to such proceeding

It was never contemplated that outsiders should meddle with the internal affairs of the carriers and their employees. It was never contemplated that this Board should be made the instrument for carrying out the ambitious schemes of the general officers of organized labor. It was never contemplated that this agency of government should be used except as dernier resort after the other means provided by law have failed—that is to say—after the parties directly interested have met each other face to face and engaged in an earnest and honest effort to adjust their own differences.

Candor, as well as a due regard for the properties we represent and the greater interest of the public dependent upon these properties for transportation, compels us to say that insofar as the American Short Line Railroad Association is concerned, it cannot and will not consent to engage in machine made proceedings. Any other course would make us participants in a controversy which in truth and fact is fictitious and where the individual carrier would be justified at the bar of public opinion in repudiating our acts and disregarding the findings of this honorable Board.

Another defense which we expect to present for the consideration of the Board is that there is an established differential in the wage scale of short line railroads which must be preserved in any decision this Board may make as to the individual carriers. The law itself recognizes the fact that the qualifications of employees, the character of labor performed, and the working and living conditions, vary on individual railroads; and it is common knowledge that the labor employed by short line railroads is not of as high a standard as that employed by the larger lines; hence their wage scale should not be as high. A demand that the same wage scale be applied to roads operating a few miles and using men that cannot qualify for service on larger lines is manifestly unjust.

It may be contended that the proposition to preserve proper differentials had reference only to employees engaged in different occupations, but it is difficult to understand why the same principle would not apply to railroads of different character.

Most if not substantially all the short line railroads cannot pay higher wages than they are now paying. They are largely undeveloped properties, constructed and operated in thinly settled territory. There is a limit beyond which they cannot go in increasing rates, even though the different commissions might authorize such increases. What doth it profit the small road if it makes the highest rate structure in the world but loseth the little traffic that it hath?

Due consideration must be given to the earning power of each

road and the individual carrier must be permitted to fix its wage scale with proper regard to its ability to earn revenue sufficient to pay its operating expenses, a fair return on the value of the property used for transportation, and thus continue to furnish service to the public.

The only reasonable basis for demands for increased wages which have been made upon the defendants in this proceeding is the increased or high cost of living brought about by the war.

When the demands which resulted in Decision No. 2 of this Board were first presented and when the decision was made, the cost of living was then at its peak. Drastic reductions in staple commodities have occurred in the last ninety days and prices are still declining.

We respectfully submit that there are 820 short line railroads in the United States, of a total mileage of 35,000 miles of track, and with property investment of more than two billion dollars. We cannot foresee how many of these roads may be cited to appear before this Board upon complaint for increased wages. Whether all, or only a part, it must be borne in mind that any addition in wages will be just that much additional burden which will ultimately be laid upon the already heavily burdened shoulders of a long-suffering and patient public, either in the form of increased rates, or the loss which must occur from the discontinuance of railroads now giving service.

In view of all the facts which we present for your consideration, we respectfully submit that the demands which have been made upon the short line railroads for standard wages ought to be denied.

Following the presentation of this statement Mr. Robinson requested certified copies of each complaint against each short line inasmuch as many of these roads maintain that no disputes or complaints have been brought to their attention. In addition, Ben B. Cain, representing the American Short Line Railroad Association, argued against the taking of the employees' previous testimony as evidence in this case, pointing out that the representatives of the short lines have had no opportunity to study this testimony or to formulate appropriate replies. S. S. Ashbaugh, also representing the American Short Line Railroad Association, requested the Board to swear in the witnesses which appeared before it.

Requests of Short Line Representatives Denied

These requests were answered at the opening of the afternoon session by Chairman Barton, who announced, first, that the Board will receive the employees' previous testimony as evidence in this case; second, that the proceedings will continue as usual without the swearing in of witnesses unless it is specifically demanded by the short line representatives, and third, that the Board will not furnish the short line representatives certified copies of the complaints, inasmuch as these are now part of the public record of and can be consulted in the Board's files. Mr. Robinson again protested the acceptance of the employees' previous testimony, However, no further action was taken in this matter.

W. L. Seddon, representing the Macon, Dublin & Savannah, the Raleigh & Charleston, the Charlotte, Monroe & Columbia, the Tampa Northern, the Tampa & Gulf Coast, the East & West Coast and the Florida Central & Gulf, was then called to present the testimony on behalf of these carriers. Mr. Seddon's position was that the lines in question had already applied to Decision 2, the July 20 award, and that therefore they were not properly before the Board in this case. In presenting his testimony, Mr. Seddon took each one of the roads separately, explaining its physical condition, its revenues and expenses, etc., and pointed out the conditions on the lines coinciding with the seven conditions upon which the Transportation Act has directed the Board to base its awards, i.e., wages, hazards of employment, amount of training and skill required, character of regularity of employment, etc.

On Friday Mr. Seddon concluded his testimony for the seven lines which he represented. H. W. Woolf, vice-president of the Atlanta & St. Andrews Bay, and C. J. Phillips, vice-president and general manager of the Brooklyn Eastern District Terminal Company, also testified at the Friday session, being questioned by Mr. Ashbaugh after being duly sworn.

Chairman Barton, at the opening of the Monday morning session, suggested that to save time the representatives of the various short lines prepare and file with the Board statements regarding the physical characteristics of their properties, their revenues and expenses, etc. Mr. Cain agreed to this suggestion. Testimony of this character, however, was presented at this session, the suggestion of the chairman applying to only those representatives who will have time to prepare such material.

W. B. Veazey, manager of the Gainsville Midland; C. J. Rogan, superintendent of the Houston & Brazos Valley; W. W. Tirrell, general auditor, and F. N. Beal, general manager of the Sandy River & Rangely Lakes, testified for their respective lines at this session.

The Monday afternoon session was devoted to hearing the testimony of F. E. Murphy, secretary and general manager of the Virginia & Truckee; A. B. Paine, representing the Tennessee, Alabama & Georgia, and E. S. McPherson, representing the Spokane International. All of these witnesses were interrogated by Mr. Ashbaugh regarding their respective lines.

Following Wednesday's session the Board adjourned until Tuesday afternoon. At this session F. Robertson, counsel of the Louisiana & Pacific; J. F. Sugrue, general superintendent of the Louisiana & Pacific, and also superintendent of the Lake Charles & Northern, and W. H. Hough, general auditor of the Susquehanna & New York, testified on behalf of their respective lines. In reply to a question brought up by Mr. Robinson, Chairman Barton stated that in all probability the decision in the case under consideration will deal only with wages, the question of working conditions being for further hearings.

The report of the Board's hearings in the *Railway Age* of October 22 contained the statement that "N. B. Kane, representing the American Association of Short Line Railroads, outlined the position of that organization in a short statement saying, 'We think that Congress intended in the expressions used to include suburban electric railways and interurban railways because such railways are used in some sections of the country as part of system lines.'" Attention has been called to the fact that the statement is that of Ben B. Cain, assistant to the president, and although the quotation is correct, it does not state the position of the Short Line Association. The sentence quoted was made by Mr. Cain, but being lifted from its context can be misinterpreted. The position of the Short Line Association is that these lines do not come under the jurisdiction of the Board, except in certain cases where they are obviously part of a general system.

Photo by Kadel & Herbert News Service

An Accident Near Paris, France, in Which a Suburban Train Sideswiped a Freight, Resulting in Forty Deaths

Comparative Cost of Government Operation*

Return of Railroads to Owners on March 1 Saved Nation's Taxpayers a Large Amount

By Samuel M. Felton
President, Chicago Great Western Railroad

DURING THE TIME when the railways were struggling with the switchmen's strike, and business was somewhat demoralized by it, the defenders of government control and advocates of the Plumb plan began to criticise private operation upon the ground that it was proving incapable of handling the country's traffic as well as it had been handled under government operation. Now that under private operation, in spite of all the difficulties that have had to be overcome, the railways are moving more freight than ever was moved under government operation, and have reduced congestions until the accumulations of loaded cars amount to only 41,000, the defenders of government operation and critics of private management have begun to use ammunition of a different kind. As you know, the government guaranteed to the railway companies during the first six months of private control the same return that it guaranteed to them under government operation. Recently widespread publicity has been given to the effect that since the railways were returned to their owners they have been incurring a large deficit which the taxpayers will have to pay. It is estimated the total deficit for the six months period will exceed $600,000,000. The inference is that the loss to the public during these six months was much more than it would have been if government operation had been continued. Propaganda to this effect is being spread all over the country by advocates of government ownership and the Plumb plan.

It is, unfortunately, true that during the first six months of private operation the companies did incur a large deficit which the taxpayers of the United States must meet. Probably the estimate that it will amount to $600,000,000 is not far from correct. Nevertheless, I am prepared to maintain, on the basis of the showing made by the Railroad Administration in the closing months of government control, that the government saved the taxpayers of the country a large amount of money by returning the railways to private operation when it did—in other words, that if government operation had been continued the deficit in these six months would have been much larger than it actually was under private operation.

Most people know that under government control the operating expenses of the railways greatly increased and that a large deficit was incurred. Most people apparently do not know that the increases in the expenses and in the deficit continued month by month right up to the termination of government control. As a matter of fact, both the operating expenses and the deficit incurred in the very last months of government control were the largest that ever were incurred under government control. Reviewing the last six months of government control we find that in August, 1919, the operating expenses were $359,000,000, while in February, 1920, they were $415,000,000, an increase of $56,000,000. In August, 1919, the net operating income earned was $92,000,000. In September it declined to $78,000,000; in October, it was $76,000,000; in November, $22,000,000; and in December, $13,000,000. In January the net operating income reported was $64,000,000, but this included $50,000,000 of back mail pay which the Interstate Commerce Commission held that the Postoffice Department owed the railways because of under payments over a period of years. The true net operating income earned in that month was only $14,000,000. In February, the last month of government operation, the operating expenses and taxes of the roads exceeded their total earnings by over $12,000,000—in other words, they earned that much less than no net operating income at all.

Since within six months the net operating income of the railways had dwindled under government operation from $92,000,000 to $12,000,000 a month less than nothing, it is reasonable to assume that if government operation had been continued the loss incurred would have kept on growing relatively greater. Let us, however, give government operation the benefit of the doubt and assume that if it had been continued for six months more the results obtained would have been relatively no worse than they were in the first two months of the year—January and February. This is very fair to government operation, for in those two months the total business handled and the total earnings made were the largest ever recorded in January and February. The government's guarantees to the railway companies in January and February, based on the net operating income actually earned by the companies in the three test years, were $104,551,000. The net operating income actually earned in those two months under government operation was only $1,930,500, or but 1.84 per cent of the guarantees. The government's guarantees to the companies for the six months from March to September 1 would have been, if government operation had been continued and they had been based on the amounts actually earned by the railways in the three test years, $457,676,000. If in those six months the government had earned only 1.84 per cent of the guarantees, as it did in January and February, the net operating income earned by it would have been only $8,421,000, leaving it with a deficit of $449,255,000.

But there are other most important factors to be considered. One of the principal reasons why under private operation the railways have incurred a large deficit is that advances in wages amounting to $52,000,000 a month, and effective during four of these six months—from May 1 to September 1—and therefore amounting for the four months to $208,000,000, were granted by the Railroad Labor Board in July. It is fair to assume that corresponding advances in wages would have been made if government control had been continued, and if this had been the case the deficit incurred by the government during these six months would have been increased to $657,255,000. In addition to all this, the railways have been subjected to increases in the prices of coal which caused their total fuel bill in July, 1920, to be $14,000,000 more than it was in July, 1919. It is a fair assumption that this increase in the cost of coal also would have occurred under government operation and would have further increased the government's deficit during the six months by $50,000,000 to $75,000,000. It is, therefore, a fair conclusion from all the facts that if government operation had been continued the deficit incurred by the government during these six months would have been not less than

*Extracts from an address delivered before the Traffic Club of Minneapolis, at Minneapolis, Minn., October 21, 1920.

$700,000,000, a figure much larger than the estimated deficit actually incurred under private operation.

Increased Expenses Under Private Control

It is undeniable that there have been large increases in expenses since the railways were returned to private operation. But these increases have been due to causes beyond the control of the managements. One of the reasons has been the large increase in wages granted by the Railroad Labor Board I have already mentioned. Another has been the large increase which has occurred in the price of coal. Another has been that, as I have said, the government returned the railways to their owners in a greatly deteriorated condition, and it has been necessary to spend larger amounts for maintenance than were spent under government control. For example, there was a large increase under government control in the number of freight cars in bad order, and, in addition to repairing all the cars they could in their own shops, the companies have had to turn over many thousands to be repaired by outside car-building and car repair companies. In the five months from March to July, inclusive, the companies spent $103,000,000 more for maintenance of way and structures and $132,000,000 more for maintenance of equipment, a total of $235,000,000 more for maintenance of both kinds, than was spent during the same months of 1919 under government control. Another factor of great importance which must not be forgotten is that the railways had to go through a series of "outlaw" strikes which were a result of the failure of the government to settle the wage controversy which was pending when the railways were returned to their owners. These strikes reduced the earnings and increased the expenses of the companies to an extent which made the deficit incurred probably $200,000,000 more than it otherwise would have been.

Improvements in Operating Efficiency

On the whole, the results gained indicate that in spite of the great increases in maintenance expenditures which have been made necessary by the deterioration of the properties under government control, the railways have been much more economically operated under private control than they would have been under government control. How has this relatively greater economy of operation been secured? It has been secured by increasing efficiency, in spite of strikes and other difficulties, in almost every way in which it could be increased. The latest complete statistics regarding operation which we have are those for July, when the effects of the "outlaw" strikes were still seriously felt. Even in that month, as compared both with February, when the railways were returned to their owners, and with July of last year, very great increases in efficiency had been secured. The average number of miles each car was moved daily in July, 1919, was 24.1 miles, while in July, 1920, it was 26.1 miles. This had the same effect as increasing the available supply of cars by 200,000. The average number of tons hauled per car in July, 1919, was 27.8 and in July, 1920, it was 29.6. This had the same effect as increasing the number of available cars by 135,000. The number of cars unfit for service in July, 1919, was 8.7 per cent, while in July, 1920, it had been reduced to 7.2 per cent. This had the same effect as increasing the number of cars by over 35,000. The average tons hauled per train was increased from 761 to 769. All these improvements helped to secure the great increase in the amount of traffic moved which has been obtained within recent months; and the increases in the average miles moved by each car daily and in the average number of tons handled in each car and each train tended strongly to keep down operating expenses. Considering all the difficulties under which they have labored, the record of increased efficiency the railways have made is one of which they are justly proud.

A. R. A. Starts Freight Claim Prevention Campaign

BECAUSE of the enormous increase in payments for loss and damage of freight within recent years, the Freight Claim Division of the American Railway Association has started a drive to reduce this item of operating expenses. As was noted in an item in last week's issue of the *Railway Age*, page 715, the association has established a permanent freight claim prevention organization within the Freight Claim Division. This new organization, the purpose of which is "the active prosecution of freight claim prevention efforts," will be known as the Committee on Cause and Prevention of the freight claim division of the association and will be directed by Lewis Pilcher, secretary of that division.

Furthermore, R. H. Aishton, president of the American Railway Association, has called a "Frieght Claim Prevention Congress" to be held at the Hotel La Salle, Chicago, on November 15 and 16. This congress, which is to be conducted by the new committee of the freight claim division, has for its purposes, as set forth in President Aishton's announcement, the following:

1. The promotion of claim prevention efforts on inactive lines.
2. The increase of effectiveness of active lines.
3. The co-ordination of efforts of individual lines into a general claim prevention movement.

The docket of subjects to be considered was given in last week's issue, page 715, in the item above referred to.

The subject of the cause and prevention of freight claims has been under consideration by the association for some time; nevertheless, it is interesting to call attention at this time to some of the measures that are being taken to obtain data regarding this important phase of railway operation and expense. A special committee composed of C. H. Deitrich, chairman, C. E. Bingham, C. C. Glessner, Leo Jessen and E. Arnold, appointed to prepare a new form for the reporting of claim statistics, completed that task last July with the result that on September 1 the carriers which are members of the association began reporting their claim statistics uniformly. This form in general is similar to that formerly used by the Interstate Commerce Commission and classifies claim payments as to both the principal causes and commodities. Thirty-four commodity divisions are shown, as compared with 24 on the old form, and space is provided for reporting the losses incurred in both c.l. and l.c.l. shipments of each commodity. The headings under which returns are made for the individual commodities are, unlocated loss, unlocated damage, rough handling of cars, improper handling, loading, unloading or stowing, defective or unfit equipment, improper refrigeration or ventilation, freezing or heater failure, delay, robbery, concealed loss or damage, wreck, fire or marine loss or damage, and error of employee.

At the bottom of this form spaces have been provided for the reporting of loss and damage claims (received from claimants) handled during the month. This statement will show the number of claims unsettled at the close of the previous month, received from claimants during the current month, reopened during the current month, paid during the current month, declined during the current month, unsettled during the current month, and the number of claims paid or declined and withdrawn within 30 days and over 30 days and not over 90 days.

It is believed that with reports being made on this form more complete information will be available by means of which loss and damage claim prevention work can be effectively directed.

It should be recalled in connection with this claim prevention work that under federal control, Director General

Walker D. Hines clearly recognized the importance of reducing loss and damage payments, and in March, 1919, started a movement to, first, prevent loss and damage to freight; second, assess correct charges, and third, dispose promptly of claims for loss and damage and for overcharges. A committee under the chairmanship of the director of the Division of Public Service of the Railroad Administration was appointed and the various regional directors were asked to take an active part in the campaign. As a result the total number of loss and damage claims on hand unsettled was reduced from 888,197 on March 1, 1919, to 465,722 on November 1, 1919, a reduction of about 48 per cent.

The way in which loss and damage freight claim payments have grown during the past six years is shown by the fact that these payments have increased from $32,375,618 in the year ending December 31, 1914, to $104,243,782 in the year ending December 31, 1919. There are several other ways in which this cost can be compared to show its relative increase as compared with increases in the traffic handled. The following table shows the relative increases in the cost of loss and damage claim payments between 1914 and 1919:

	Per cent 1914	Per cent 1919
Ratio of amount paid to total operating revenues	1.117*	2.52†
Ratio of amount paid to total operating expenses	1.551*	2.97†
Ratio of amount paid to total freight revenues	1.625*	3.67†
Ratio of amount paid to net earnings	3.08*	17.2†
Ratio of amount paid to net freight earnings	....	23.3†

* I. C. C. Statistics.
† Computed.

The object of the movement started by President Aishton is to reduce these ratios by means of co-ordinating claim prevention work and extending it to all lines.

Railway Fire Protection Association Meets at Baltimore

THE FIRST day's proceedings of this association at its Seventh annual meeting, in Baltimore, Md., on October 19, 20 and 21, was the subject of a report printed in the *Railway Age* last week, page 695. The next chapter of the doings of the meeting begins with a report on the care of gasolene and electric trucks in freight and passenger stations, by a committee, of which E. J. Reilly (Erie) is chairman. Mr. Reilly read the report. The committee finds that the use of these trucks is not very extensive. This class of machine finds favor, as a rule, only where the haul is long. Gasolene fuel is looked upon with some favor, notwithstanding the hazards of storing and handling it; and some roads are considering the adoption of stringent safety rules so as to permit the use of this class of power. With electric trucks the principal fire hazard is in connection with the insulation and ventilation of charging apparatus.

In the paucity of information the committee made no attempt at an exhaustive report; but presented a tentative code of rules, 25 paragraphs, for the care of these tractors. These rules were briefly discussed.

The use of gasolene tractors has been considered in various quarters, and it is understood that the Fire Department of New York City is ready to permit their use in buildings, but only on the ground floor. The committee had not inspected the Ford gasolene truck. A considerable number of members were in favor of forbidding the use of gasolene motors within buildings without exception; but attention was called to the fact that in freight sheds, on piers and elsewhere, the trucks of shippers are allowed to come in; and it would be unwise to adopt too strict a rule. W. H. Klinsick (C. B. & Q.) said that his road was considering seriously the use of gasolene motors in freight houses.

Several members suggested changes in some of the paragraphs of the proposed rules and the committee was instructed to keep up its study of the subject for another year.

Protection of Shop Plants

The most of the time of the association on Wednesday forenoon was taken up with a discussion of a report, on fire prevention and protection of shop plants, by a committee of which J. R. Peters (Penn.) is chairman. This report filled 21 large typewritten pages and included a statement of the risks, precautions and remedies in connection with locomotive plants, engine houses, coaling plants, oil houses, store houses, power plants, air brake shops, foundries, yards and other features. Mr. Peters read the report, one chapter at a time, each chapter being followed by some desultory discussion. W. S. Wollner (N. W. P.) reported experimental use of electric flood lights in round houses, between stalls. For doing work under engines, extension lights, on cords, are used. On the Chesapeake & Ohio, conduits for electric lights in engine houses are run beneath the floor so as to avoid the destructive effect of gases in the upper part of the house. Mr. Steffens (N. Y. C.) recommends for workmen in dark places carbide lamps, to be worn on the hat; with such a lamp the workman has both of his hands free for his work. Mr. Steffens' remarks brought out a discussion of the hazards connected with the use of carbide.

On the Big Four the records of 25 years show that half of the fire losses connected with round houses were due to fire started by backfire sending flame out through staybolts and setting fire to wooden cabs.

Considering blacksmith-shop risks, care of fires at night was taken up. The approved practice appears to be to put out all fires, with water, when the workmen leave. The helper should light the fires in the morning a half-hour before work is to begin.

The time available expired before the whole of the report had been read, and it was recommitted, Mr. Peters requesting members to send him their criticisms in writing. The president reminded all members to read carefully the report, when it comes out in the proceedings, containing, as it does, matter of great value to all.

Franklin H. Wentworth, secretary of the National Fire Protection Association, Boston, invited to address the meeting, gave a brief but stirring narrative of his work in arousing municipal officers, fire departments and citizens generally, all over the country, on the importance of fire prevention, as distinguished from fire extinguishment. The most accurate measure of the success of fire prevention is a decrease in the number of fire alarms, and this encouraging decrease has been accomplished in some cities. This country still has far to travel before attaining to the rational position of France, where, if you have a fire and it is conveyed to your neighbor's building, you are likely to have to pay damages to him. In New York City, the fire department may recover from a property owner, who has a fire due to carelessness, the cost of putting it out. This provision of the city charter has been enforced in a few instances.

Hazards Incident to the Location of Industries on Railroad Rights-of-Way

W. F. Hickey (N. Y., N. H. & H.), vice-president of the association, presented a paper on this subject, calling attention to the enormous developments in industrial activities during recent years, accompanied by the largely increased use of petroleum and other highly inflammable materials by manufacturing concerns. Circular No. 190 of the Bureau of Explosives gives useful recommendations concerning the best practice in handling petroleum products with a flash point below 30 deg. F. In establishing new unloading tracks for gasolene, naphtha, etc., special care should be taken in selecting the location and in making connections. Mr. Hickey quotes the regulations in force on one New England road. Privileges should be granted to industries only after approval of the insurance department. The use of oil as fuel by industries is a matter needing constantly to be

watched. A concrete pit is very desirable where such fuel is unloaded; or, if the ground is allowed to be saturated with oil, fresh earth should be brought in frequently. Storage tanks should not be allowed on railroad property near the main track. The delivery of petroleum products in team track yards is very objectionable, and the delivery there of products which have a flash point below 30 deg. should be forbidden.

In every application for a side track the question of the probable use of chemicals and acids should be carefully considered. On electrified railroads the danger from gasolene fumes in a moisture laden atmosphere must be looked after, as such fumes coming in contact with an accidental arc may start a fire. Industries handling rags and waste, as well as reclamation plants, must be carefully watched. Freight agents should know the exact nature of all commodities loaded by shippers on private sidetracks.

It is for the interest of every railroad, of course, to accommodate shippers to the utmost; and in view of the possibility that the spirit of accommodation may be carried too far, it is very desirable that the carriers should have uniform regulations, particularly all carriers in the same region. The paper quotes the fire clause which is in use in the sidetrack contract form of a prominent road.

In the discussion on this paper, the importance of a strong side-track contract was emphasized, even if in many cases it is not of specific benefit to the railroad company. In case of fire, the burden of proof is on the railroad company and so the experience of most members was that collection of damages was not very frequent; but some roads mentioned successful suits. Industrial concerns have made a plea before the Interstate Commerce Commission asking for the establishment of a form of contract between railroads and industries which shall be more favorable to the latter.

Following the discussion, Mr. Hickey was thanked for preparing the paper.

A Symposium

The informal discussion of practical problems of field engineers, scheduled for Thursday, was taken up on Wednesday afternoon. P. A. Bissell, who, last year, was an inspector for the United States Railroad Administration, told of some of the lessons which he learned when traveling for the government. The cleaning and whitewashing of the interior of the roofs of blacksmith shops was found to be an important matter. Such cleanliness not only lessens fire risks, but increases the efficiency of the workmen. On the Oregon Short Line, the interiors of blacksmith shops are washed once a month by means of hose. The Bangor & Aroostook uses compressed air for this purposes. Mr. Bissell found considerable careless work in connection with the collection of shavings. All woodwork refuse should be collected in a brick chamber. Fires started in shavings by backfire from the furnace sometimes make trouble; this should be prevented by a check valve in the ducts used to convey the shavings. Inspection of ventilating ducts in large plants is a work which has been much neglected. One member reported that in a casing of considerable size the workmen used the space in which to eat their luncheons and to smoke.

E. W. Osborne (N. P.) giving his notes on hazards in terminal operation said that careless construction of freight houses and neglect to gather refuse from freight cars in yards were fields needing attention. Local freight houses, except the shortest, should have one or more transverse fire walls. Even a wooden wall is better than nothing. A. D. Brooks (N. Y. C.) declared that only a metal car should be used to gather refuse in freight yards; and, except when empty, should not be left standing near the freight house. Overhanging eaves should be abandoned on freight houses, except on the side toward the street. Anson Murphy (M. R. & B. T.) questioned the need of a rubbish car; why not burn up all rubbish every day?

Experiences with oxyacetylene were given by a number of members. On the St. Louis-San Francisco, pipes in this apparatus are painted; red on the oxygen pipes and green on the acetylene pipes. The use of a cloth funnel in pouring carbide was favored; and also was criticized, on the ground that the cloth, being an insulator, might favor the accumulation of a static electric charge.

E. Williamson (Sou. Ry.) appointed to discuss "individual responsibility," introduced two other members who had collaborated with him, W. Sharp (C. R. I. & P.) and I. Hunter (S. A. L.). To fix individual responsibility for fire losses the field engineer must use all his resources. He must be sure of himself and his ability for his own job; and be certain of the completeness of his information; he must convince the men on the jobs that the engineer's counsel is sound. It was recommended that each railroad appoint a propaganda committee. Fire prevention committees should be established on each division, with monthly meetings, such as the safety-first people have. A set of resolutions was presented embodying these recommendations. Every fire should be investigated and suitable discipline enforced; at the same time it is important to foster friendly intercourse between the management and the employees. Bulletins should be issued for the information of employees; and employees' magazines should be used to disseminate the desired information.

On motion of F. H. Elmore it was voted that the executive committee should send these recommendations to all railroads.

L. F. Shedd (C. R. I. & P.) called attention to the futility of depending fully on circulars to inculcate right ideas and establish good practice. Mr. Shedd is in charge, on his road, of both fire prevention and the usual safety organizations; and he cited various points from his experience in the latter as useful to the fire prevention men. He emphasized the importance of being careful to convince all employees of your friendly interest; with many of them "discipline" is a bugbear, and that feeling must be dispelled. This discussion was closed by Mr. Elmore who endorsed all the good things said about improving the rank and file, but ended by saying that the particular problem was to reach the man at the top.

Plans for the Coming Year

Before proceeding to new business the meeting voted, revising its action of Tuesday, to approve the use of fire extinguishers in more specific terms. The meeting evidently agreed with Mr. Murphy, who expressed his intention of saying, in each case, just what he meant: for electric appliances use the tetrachloride extinguisher; for oil fires use foamite and sand; for shavings, etc., the 2½-gallon type. The resolution as finally recorded approves, for oil fires, any form of extinguisher which has been approved, for that use, by the Underwriters' Laboratory.

The president announced that a publicity committee was to be established and that the proceedings of the association would be sent to all railroads.

The association, after making a change in two clauses of the constitution, elected officers for the ensuing year as follows: President, W. F. Hickey (N. Y. N. H. & H.); Vice-President, George L. Ball (St. L.-S. F.); Secretary and Treasurer, R. R. Hackett (B. & O.), Baltimore, Md. Vacancies on the executive committee were filled by the election of E. B. Berry, Robert Scott and G. R. Hurd.

On Wednesday afternoon, James Lalor gave a brief lecture, illustrated by stereopticon views, on the best methods of constructing and managing fuel oil appliances, and on Thursday afternoon the members and guests were entertained at luncheon by the Baltimore & Ohio Railroad on a municipal steamer, which took the party around the harbor, to inspect the railroad docks and terminals.

The Pyrene Mfg. Co., New York City, had at the hotel an exhibit of fire extinguishers and its automatic alarm.

Commission Points to Records Made by Railroads

Statement Compiled by Its Bureau of Statistics Shows Improvement in Efficiency as Compared with Last Year

WASHINGTON, D. C.

THE INTERSTATE COMMERCE COMMISSION, on October 22, made public the following statement by its Bureau of Statistics on the freight operating statistics for July and the first seven months of this year as compared with the corresponding months of last year:

The monthly summary of operating statistics shows a marked improvement in the factors measuring efficiency in the movement of freight traffic, train loading and car performance as compared with last year. Barring April, which was somewhat distorted by switchmen's strikes, there has been a gradual increase in all factors since the first of the year, with the exception of the per cent loaded of total freight car miles which shows a downward tendency, due principally to the necessity of moving large numbers of empty box cars from the East and South to grain originating lines in the West; also to the necessary restrictions placed on the use of open top cars, forcing, as it did, the prompt return of empty cars to the mines. With the car surplusages of last year the necessity for these measures did not exist in 1919. Reports indicate that during July, 1920, 40,232,000,000 of net ton miles were produced in exclusive freight service by Class I roads, which, according to statistics compiled by the United States Railroad Administration, tops all records for any one month's operation since April, 1916, and probably in the history of railroads. The next highest record was made in October, 1919, when 40,166,632,000 net ton-miles were accomplished.

July, 1920, compared with July, 1919, net ton-miles increased 15.2 per cent; train miles increased 14.0 per cent, and loaded car-miles increased 8.7 per cent. There was an increase in train load of 1.1 per cent; car load increased 6.1 per cent, and car miles per car day 8.7 per cent. While the per cent of loaded to total car miles decreased 0.4 per cent, the decrease was more than offset by the increases shown in the car load and the car miles per car-day. As a result the net ton-miles per car-day, which is the ultimate measure of freight car utilization, shows the substantial increase of 14.8 per cent. This item is the resultant of car-load, percent of loads and car-miles per car-day.

For the seven months' period ended with July, 1920, compared with the same period of 1919, there was an increase of 17.1 per cent in net ton-miles. Train-miles increased 15.5 per cent and loaded car-miles increased 16.3 per cent.

Train load increased 1.4 per cent and the car load increased 0.7 per cent. The per cent loaded of total car-miles increased 4.6 per cent and car-miles per car-day increased 8.5 per cent. The changes in car load, the per cent of loads and car-miles per car-day resulted in an increase of 14.8 per cent in net ton-miles per car-day.

TABLE I

COMPARISON OF THE PRINCIPAL ITEMS, JULY, 1920, WITH JULY, 1919

Item	July, 1920	July, 1919	Increase or decrease: Amount	Increase or decrease: Per Cent
Total net ton miles (millions)	40,232	34,916	5,316	15.2
Freight train miles (thousands)	52,315	45,910	6,405	14.0
Freight car miles (thousands):				
Loaded	1,354,139	1,246,228	107,911	8.7
Empty	645,335	587,327	58,008	9.9
Total	1,999,474	1,833,555	165,919	9.0
Cars on line daily	2,304,655	2,257,845	46,810	2.1
Averages				
Net ton-miles per mile of road—per day	5,657	4,940	717	14.5
Net ton-miles per train-mile	769	761	8	1.1
Net ton-miles per loaded car mile	29.7	28.0	1.7	6.1
Per cent loaded of total car miles	67.7	68.0	d 0.3	d 0.4
Car-miles per car day	26.2	24.1	2.1	8.7
Net ton-miles per car day	526	458	68	14.8
Cost per freight train-mile (selected accounts)	$1.897	$1.540	$.357	23.2

The cost per freight train miles (selected accounts) shows an increase of 23.2 per cent as compared with last year. A definite explanation is not available but is probably due to heavy repairs to locomotives, increased cost of material and in some cases the inclusion of back pay adjustments.

TABLE II

COMPARISON OF THE PRINCIPAL ITEMS OF PERFORMANCE FOR THE SEVEN MONTHS' PERIOD ENDED WITH JULY AND THE SAME PERIOD, 1919

Item	Seven months: 1920	Seven months: 1919	Increase or decrease: Amount	Increase or decrease: Per Cent
Total net ton miles (millions)	248,999	212,706	36,293	17.1
Freight train miles (thousands)	345,909	299,521	46,388	15.5
Freight car miles (thousands):				
Loaded	8,678,977	7,463,001	1,215,976	16.3
Empty	3,674,772	3,649,984	24,788	.7
Total	12,353,749	11,112,985	1,240,764	11.2
Cars on line daily	2,359,402	2,311,283	48,119	2.1
Averages				
Net ton miles per mile of road per day	5,114	4,410	704	16.0
Net ton-miles per train mile	720	710	10	1.4
Net ton-miles per loaded car mile	28.7	28.5	.2	.7
Per cent loaded of total car miles	70.3	67.2	3.1	4.6
Car-miles per car day	23.1	21.3	1.8	8.5
Net ton-miles per car day	465	407	58	14.3
Cost per freight train-mile (selected accounts)	$1.854	$1.635	$.219	13.4

During the seven months ended with July, 1920, there were 248,999,000,000 net ton miles produced.

Monthly statistics compiled by the U. S. Railroad Administration for the four years ended with 1919, indicate that the total net ton miles for the months January to July, inclusive of these four years, produced 56.46 per cent of the total. Assuming that this percentage will be maintained in 1920 the year's figures will far exceed all past records.

TABLE III

COMPARISON OF SIGNIFICANT AVERAGES FOR JULY, 1920, AND THE SIX MONTHS PRECEDING IS AS FOLLOWS:

Item	July	June	May	April	March	Feb'y	Jan'y
Traffic density (net ton miles per mile of road per day)	5,657	5,531	5,292	4,120	5,432	4,901	4,866
Train load (net ton-miles per train mile)	769	758	746	666	725	693	672
Car load (net ton-miles per loaded car mile)	29.7	29.1	28.3	28.6	28.3	28.3	28.3
Per cent loaded of total car miles	67.7	69.5	71.2	68.4	72.3	71.9	70.8
Car miles per car day	26.2	25.0	24.3	19.5	23.8	22.3	22.8
Net ton-miles per car day	526	505	489	379	495	453	457
Cost per freight train mile (selected accounts)	$1.897	$1.879	$1.780	$1.874	$1.793	$1.912	$1.859

It will be noticed that substantial improvement is reflected in all items except the percentage loaded of total car miles. The decrease shown in this unit is largely brought about by relocation orders made necessary by unbalanced traffic.

Analysis by Factors and Regions

Following is an analysis of each significant item by regions:

TABLE IV

TRAFFIC DENSITY (NET TON MILES PER MILE OF ROAD PER DAY)
July, 1920, Compared with July, 1919

Regions	July, 1920	July, 1919	Increase or decrease: Amount	Increase or decrease: Per cent
New England	4,314	3,848	466	12.1
Great Lakes	11,153	8,799	2,354	26.8
Ohio-Indiana-Allegheny	11,982	10,910	1,072	9.8
Pocahontas	15,155	13,565	1,590	11.7
Southern	4,022	3,429	593	17.3
Northwestern	3,585	3,452	133	3.9
Central Western	4,056	3,545	511	14.4
Southwestern	2,997	2,407	590	24.5
All regions	5,657	4,940	717	14.5

Reports from each region show an increase; Great Lakes leads with 26.8 per cent; the lowest is 3.9 per cent recorded in the Northwestern region.

TABLE V

TRAFFIC DENSITY (NET TON-MILES PER MILE OF ROAD PER DAY)
January, 1920, to July, 1920, Both Inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	4,314	4,190	4,229	3,623	3,529	2,248	3,569
Great Lakes	11,153	10,380	9,133	6,436	9,967	8,309	8,307
Ohio-Indiana-Allegheny	11,982	11,333	10,889	7,708	11,594	9,349	9,340
Pocahontas	15,155	14,585	13,304	12,540	13,848	12,316	12,829
Southern	4,022	4,231	4,214	3,757	4,167	3,983	4,007
Northwestern	3,585	3,518	3,535	2,906	3,487	3,407	3,114
Central Western	4,056	4,152	4,019	2,967	4,058	4,117	4,049
Southwestern	2,997	2,879	2,882	2,377	2,803	2,807	2,653
All regions	5,657	5,531	5,292	4,120	5,432	4,901	4,866

It will be noted that there has been a general upward tendency in all regions since January, 1920.

TABLE VI

TRAIN LOAD (NET TON-MILES PER FREIGHT TRAIN MILE)
July, 1920, Compared with July, 1919

Regions	July, 1920	July, 1919	Increase or decrease: Amount	Increase or decrease: Per cent
New England	502	501	1	0.2
Great Lakes	973	906	67	7.4
Ohio-Indiana-Allegheny	936	952	d 16	d 2.0
Pocahontas	1,280	1,272	8	0.6
Southern	566	583	d 17	d 2.9
Northwestern	735	733	2	0.3
Central Western	672	663	9	1.4
Southwestern	587	544	43	7.9
All regions	769	761	8	1.1

The small decreases appearing in the Ohio-Indiana-Allegheny and the Southern regions are more than offset by other regions. The regions as a whole report an increase of 1.1 per cent.

TABLE VII

TRAIN LOAD (NET TON-MILES PER FREIGHT TRAIN MILE)
January, 1920, to July, 1920, Both Inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	502	486	498	453	455	369	425
Great Lakes	973	953	907	781	858	777	744
Ohio-Indiana-Allegheny	936	933	918	792	870	800	779
Pocahontas	1,280	1,249	1,214	1,248	1,238	1,154	1,175
Southern	566	574	574	555	583	580	577
Northwestern	735	739	742	639	682	660	614
Central Western	672	676	676	612	666	676	648
Southwestern	587	555	561	507	550	564	553
All regions	769	758	746	666	725	693	672

The average of 769 net tons per freight train not only exceeds the train load in any month since the Government relinquished control, but according to statistics compiled by the U. S. Railroad Administration, it is greater than any month during Federal operation.

TABLE VIII

CAR LOAD (NET TON MILES PER LOADED CAR MILE)
July, 1920, Compared with July, 1919

Regions	July, 1920	July, 1919	Increase or decrease: Amount	Increase or decrease: Per cent
New England	25.3	23.2	2.1	09.1
Great Lakes	30.2	27.2	3.0	11.0
Ohio-Indiana-Allegheny	35.2	34.2	1.0	2.9
Pocahontas	42.4	40.7	1.7	4.2
Southern	25.9	24.5	1.4	5.7
Northwestern	28.2	26.7	1.5	5.6
Central Western	26.0	24.8	1.2	4.8
Southwestern	26.6	24.4	2.2	9.0
All regions	29.7	28.0	1.7	6.1

Every region reports an increase in car load; the regions as a whole show an increase over July last year of 6.1 per cent.

TABLE IX

CAR LOAD (NET TON MILES PER LOADED CAR MILE)
January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	25.3	24.0	24.1	24.2	23.5	23.9	23.4
Great Lakes	30.2	28.9	28.0	29.0	27.9	28.3	27.6
Ohio-Indiana-Allegheny	35.2	35.1	33.9	34.6	33.1	33.0	33.3
Pocahontas	42.4	40.8	40.1	44.4	42.4	40.2	41.9
Southern	25.9	25.9	25.3	25.8	25.9	26.1	26.3
Northwestern	28.2	27.8	27.2	26.1	26.6	26.1	25.8
Central Western	26.0	26.0	25.6	25.9	25.9	26.3	26.5
Southwestern	26.6	25.4	24.7	24.9	24.9	25.6	26.0
All Regions	29.7	29.1	28.3	28.6	28.3	28.3	28.3

It is interesting to note the improvement month by month in almost every region. The car load, 29.7 tons, reported in July, is particularly interesting when it is recalled that the executives recently set 30 tons per car as the ideal which the roads should strive to attain.

TABLE X

PER CENT LOADED OF TOTAL FREIGHT CAR MILES
July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or Decrease: Amount	Increase or Decrease: Per Cent
New England	70.3	70.6	d 0.3	d 0.4
Great Lakes	68.9	69.0	d 0.1	d 0.1
Ohio-Indiana-Allegheny	67.3	66.7	0.6	0.9
Pocahontas	60.9	61.9	d 1.0	d 1.6
Southern	67.8	71.8	d 4.0	d 5.6
Northwestern	67.2	66.2	1.0	1.5
Central Western	67.9	67.8	0.1	0.1
Southwestern	69.8	69.9	d 0.1	d 0.1
All Regions	67.7	68.0	d 0.3	d 0.4

Very little change is reported in the per cent of loaded of total freight car miles. Small decreases appear in New England, Great Lakes, Pocahontas, Southern and Southwestern regions. Other regions report small increases. The regions as a whole show a decrease of 0.4 per cent.

TABLE XI

PER CENT LOADED OF TOTAL FREIGHT CAR MILES
January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	70.3	71.4	72.6	71.3	77.5	76.6	73.6
Great Lakes	68.9	71.3	72.5	67.0	74.6	73.9	71.8
Ohio-Indiana-Allegheny	67.3	68.4	69.8	65.8	69.6	69.3	67.5
Pocahontas	60.9	62.6	64.2	59.6	61.4	62.8	62.1
Southern	67.8	69.7	71.0	69.5	72.7	72.9	72.5
Northwestern	67.2	71.1	73.2	72.1	75.8	74.7	73.8
Central Western	67.9	69.5	71.6	70.3	72.9	71.9	71.0
Southwestern	69.8	68.7	71.0	68.2	70.8	71.8	72.1
All Regions	67.7	69.5	71.2	68.4	72.3	71.9	70.8

There is a bad showing in the percentage loaded of total freight car miles compared with other months, January to July. It is not restricted to any particular region. A downward tendency is shown in every region.

TABLE XII

CAR-MILES PER CAR DAY
(Serviceable and unserviceable cars included.)
July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or Decrease: Amount	Increase or Decrease: Per Cent
New England	18.0	17.9	0.1	0.6
Great Lakes	24.3	23.8	0.5	2.1
Ohio-Indiana-Allegheny	21.1	22.0	d 0.9	d 4.1
Pocahontas	38.9	29.1	9.8	33.7
Southern	31.0	25.8	5.2	20.2
Northwestern	26.7	26.2	0.5	1.9
Central Western	33.6	27.8	5.8	20.9
Southwestern	25.5	19.3	6.2	32.1
All Regions	26.2	24.1	2.1	8.7

With the exception of the Ohio-Indiana-Allegheny region, every region shows an increase in car-miles per car-day in July, 1920, as compared with the same month last year. These increases should be expected when we note that in July, 1919, the amount of traffic offered for movement was small and that nearly 70,000 cars were stored, while in July, 1920, traffic was probably the heaviest in history, taxing freight carrying equipment to the limit.

The decrease shown in the Ohio-Indiana-Allegheny compared with July last year, was probably due to an abnormal volume of traffic resulting in congestion.

TABLE XIII

CAR-MILES PER CAR DAY
(Serviceable and unserviceable cars included.)
January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	18.0	17.4	15.8	13.3	12.5	8.2	14.5
Great Lakes	24.3	23.1	21.0	15.3	21.4	18.9	20.7
Ohio-Indiana-Allegheny	21.1	19.8	20.5	15.6	21.9	19.4	20.1
Pocahontas	38.9	38.9	36.5	34.4	38.5	33.7	30.7
Southern	31.0	30.2	28.5	24.7	27.2	26.0	26.1
Northwestern	26.7	24.5	24.4	20.6	22.1	22.5	21.2
Central Western	33.6	32.4	31.8	23.6	31.5	30.4	30.3
Southwestern	25.5	24.4	23.9	19.8	21.4	21.6	20.8
All Regions	26.2	25.0	24.3	19.5	23.8	22.3	22.8

The preceding table XII shows, for July, 1920, compared with July, 1919, increases which should be expected in view of the increase in tonnage. The above table shows that in spite of the abnormal amount of traffic handled, this factor of efficiency is showing an improvement month by month.

TABLE XIV

NET TON MILES PER CAR DAY

July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or Decrease Amount	Per cent
New England	319	292	27	9.2
Great Lakes	506	446	60	13.5
Ohio-Indiana-Allegheny	499	500	d 1	d 0.2
Pocahontas	1,004	734	270	36.8
Southern	544	452	92	20.4
Northwestern	503	462	41	8.9
Central Western	592	466	126	27.0
Southwestern	473	328	145	44.2
All Regions	526	458	68	14.8

The net ton-miles per car-day, which is the resultant of the car-load, per cent of load, and car-miles per day, shows for all regions the substantial increase of 14.8 per cent. A small decrease appears in the Ohio-Indiana-Allegheny but very large increases are reported by the Pocahontas, Southern, Central Western and Southwestern regions. These abnormal increases were probably due to a greater number of cars being on line in 1919 and at the same time the net ton-miles were very materially less than in July, 1920.

TABLE XV

NET TON-MILES PER CAR DAY

January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	319	299	276	228	227	150	248
Great Lakes	506	475	427	297	445	394	411
Ohio-Indiana-Allegheny	499	477	484	355	544	444	452
Pocahontas	1,004	995	938	910	1,003	852	798
Southern	544	545	512	442	512	495	498
Northwestern	503	483	484	385	444	437	403
Central Western	592	583	583	429	593	525	570
Southwestern	473	426	419	335	377	397	390
All Regions	526	505	489	379	495	453	457

Net ton miles per car day, which is the final unit in measuring freight car utilization, shows an increase since the first of the year.

TABLE XVI

CONDITION OF FREIGHT CAR EQUIPMENT

PER CENT OF FREIGHT CARS UNSERVICEABLE

July, 1920, compared with July, 1919

Regions	July, 1920	July, 1919
New England	8.1	9.0
Great Lakes	7.8	8.5
Ohio-Indiana-Allegheny	6.5	11.2
Pocahontas	8.1	8.4
Southern	7.1	9.5
Northwestern	7.7	7.6
Central Western	6.9	7.8
Southwestern	6.3	5.4
All Regions	7.2	8.8

The per cent of freight cars unserviceable in July, 1920, compared with July, 1919, shows considerable improvement in every region, with the exception of the Northwestern and Southwestern regions, where small increases are shown.

All regions, however, show a decrease from 8.8 to 7.2 per cent.

TABLE XVII

PER CENT OF FREIGHT CARS UNSERVICEABLE

January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	8.1	7.4	6.3	6.8	7.2	6.8	7.3
Great Lakes	7.8	7.5	6.8	6.7	7.3	7.2	7.5
Ohio-Indiana-Allegheny	6.5	6.3	6.1	6.3	7.7	8.1	7.7
Pocahontas	8.1	9.9	7.9	8.1	8.7	8.1	7.3
Southern	7.1	7.5	7.6	6.8	6.7	5.5	5.7
Northwestern	7.7	7.7	7.0	7.4	7.4	6.3	6.2
Central Western	6.9	6.5	6.1	6.0	6.1	5.5	5.7
Southwestern	6.3	6.3	5.7	4.9	5.1	4.5	4.3
All Regions	7.2	7.0	6.6	6.5	7.0	6.5	6.6

July, 1920, reports show a larger percentage of bad-order cars than any month since the first of the year, but as indicated by table XVI an improvement is shown compared with July, 1919.

TABLE XVIII

COST PER FREIGHT TRAIN MILE

LOCOMOTIVE REPAIRS

July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or decrease Amount	Per cent
New England	$0.422	$0.357	$0.065	18.2
Great Lakes	.496	.405	.091	22.5
Ohio-Indiana-Allegheny	.623	.554	.069	12.5
Pocahontas	.549	.460	.089	19.3
Southern	.391	.325	.066	20.3
Northwestern	.343	.294	.049	16.7
Central Western	.489	.412	.077	18.7
Southwestern	.457	.380	.077	20.3
All Regions	.477	.405	.072	17.8

Abnormal increases in cost of freight locomotive repairs per freight train mile are recorded in the Great Lakes, Southern, Southwestern and Pocahontas regions. These increases are probably explained by heavy locomotive repairs and increased cost of material.

TABLE XIX

COST PER FREIGHT TRAIN MILE

LOCOMOTIVE REPAIRS

January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	$0.422	$0.401	$0.365	$0.429	$0.497	.....	.....
Great Lakes	.496	.532	.456	.593	.442	.....	.....
Ohio-Indiana-Allegheny	.623	.695	.655	.682	.567	.....	.....
Pocahontas	.549	.569	.586	.638	.576	.....	.....
Southern	.391	.395	.339	.371	.354	.....	.....
Northwestern	.343	.353	.350	.387	.379	.....	.....
Central Western	.489	.434	.440	.527	.451	.....	.....
Southwestern	.457	.431	.482	.450	.424	.....	.....
All Regions	.477	.483	.459	.505	.449	.....	.....

The figures for January and February are not available, as the U. S. Railroad Administration combined locomotive repairs and enginehouse expense in computing average cost per freight train-mile.

TABLE XX

COST PER FREIGHT TRAIN MILE

FUEL

July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or decrease Amount	Per cent
New England	$1.040	$0.584	$0.456	78.1
Great Lakes	.661	.430	.231	53.7
Ohio-Indiana-Allegheny	.594	.366	.228	62.3
Pocahontas	.779	.461	.318	69.0
Southern	.468	.348	.120	34.5
Northwestern	.523	.474	.049	10.3
Central Western	.556	.473	.083	17.5
Southwestern	.506	.435	.071	16.3
All Regions	.584	.428	.156	36.4

The cost of fuel per freight train mile shows an unfavorable comparison with July last year. New England reports over 78 per cent increase. Pocahontas, a heavy coal producing region, not only shows 69 per cent increase over same month last year, with practically the same train load, but it is the highest of all regions with the exception of New England.

TABLE XXI

COST PER FREIGHT TRAIN MILE

FUEL

January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	$1.040	$0.901	$0.819	$0.899	$0.824	$0.956	$0.798
Great Lakes	.661	.662	.647	.634	.630	.718	.684
Ohio-Indiana-Allegheny	.594	.605	.569	.585	.534	.576	.568
Pocahontas	.779	.869	.638	.609	.587	.602	.606
Southern	.468	.449	.451	.455	.430	.480	.451
Northwestern	.523	.545	.527	.550	.560	.634	.636
Central Western	.556	.555	.539	.561	.551	.554	.618
Southwestern	.506	.518	.614	.527	.526	.527	.583
All Regions	.584	.583	.563	.569	.551	.593	.598

TABLE XXII

COST PER FREIGHT TRAIN MILE

ENGINEMEN

July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or decrease Amount	Per cent
New England	$0.345	$0.256	$0.089	34.8
Great Lakes	.343	.239	.104	43.5
Ohio-Indiana-Allegheny	.352	.276	.076	27.5
Pocahontas	.295	.258	.037	14.3
Southern	.226	.183	.043	23.5
Northwestern	.240	.211	.029	13.7
Central Western	.243	.205	.038	18.5
Southwestern	.234	.207	.027	13.0
All Regions	.281	.226	.055	24.3

Every region shows an increase in enginemen pay roll expense per freight train mile compared with July, 1919. Very large increases appear in New England, Great Lakes and Ohio-Indiana-Allegheny and Southern regions. The explanation is not available.

TABLE XXIII

COST PER FREIGHT TRAIN MILE

ENGINEMEN

January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	$0.345	$0.320	$0.308	$0.312	$0.354	$0.388	$0.326
Great Lakes	.343	.292	.284	.298	.312	.336	.306
Ohio-Indiana-Allegheny	.352	.347	.319	.333	.350	.353	.355
Pocahontas	.295	.284	.273	.280	.282	.303	.329
Southern	.226	.223	.203	.211	.217	.218	.218
Northwestern	.240	.243	.240	.250	.255	.249	.245
Central Western	.243	.215	.212	.220	.218	.223	.222
Southwestern	.234	.223	.249	.224	.238	.239	.239
All Regions	.281	.263	.254	.260	.271	.276	.271

TABLE XXIV

COST PER FREIGHT TRAIN MILE

TRAINMEN

July, 1920, compared with July, 1919

Regions	July 1920	July 1919	Increase or decrease Amount	Increase or decrease Per cent
New England	$0.390	$0.292	$0.098	33.6
Great Lakes	.345	.278	.067	24.1
Ohio-Indiana-Allegheny	.388	.305	.083	27.2
Pocahontas	.283	.255	.028	11.0
Southern	.284	.233	.051	21.9
Northwestern	.279	.249	.030	12.0
Central Western	.273	.225	.048	21.3
Southwestern	.300	.268	.032	11.9
All Regions	.316	.261	.055	21.1

As in the case of enginemen, it will be noted that trainmen pay roll expense per freight train mile is unfavorable as compared with July, 1919. This explanation is also not available.

TABLE XXV

COST PER FREIGHT TRAIN MILE

TRAINMEN

January, 1920, to July, 1920, both inclusive

Regions	July	June	May	April	March	Feb'y	Jan'y
New England	$0.390	$0.341	$0.340	$0.345	$0.386	$0.430	$0.353
Great Lakes	.345	.314	.317	.345	.351	.370	.345
Ohio-Indiana-Allegheny	.388	.381	.344	.375	.387	.382	.392
Pocahontas	.283	.274	.266	.286	.276	.290	.310
Southern	.284	.280	.250	.274	.276	.274	.272
Northwestern	.279	.283	.279	.291	.300	.283	.279
Central Western	.273	.243	.235	.248	.245	.247	.248
Southwestern	.300	.282	.322	.206	.306	.313	.304
All Regions	.316	.300	.289	.304	.313	.313	.309

Railway Earnings in 1919

THE BUREAU OF RAILWAY ECONOMICS has issued a bulletin presenting preliminary statistics of the earnings of railways of Class I during the calendar year 1919, which was the second year of the period of government control and operation of the American railway system.

Operating revenues for 1919 amounted to $5,184,230,000, an increase over 1918 of $257,636,000, or 5.2 per cent. Freight revenue increased 2.8 per cent, and passenger revenue 14.1 per cent. Operating expenses aggregated $4,419,989,000, which was an increase over 1918 of $402,779,000, or 10.0 per cent. Maintenance of way expenditures increased 18.5 per cent, maintenance of equipment 11.0 per cent, and transportation 6.7 per cent. The operating ratio was 85.26 per cent, as compared with 81.54 per cent in 1918. Net operating revenue amounted to $764,241,000, a decrease of $145,143,000, or 16.0 per cent. Taxes were $199,194,000, an increase of $12,228,000, or 6.5 per cent.

As compared with the annual average of the test period, operating revenues in 1919 increased 52.7 per cent and operating expenses 92.4 per cent, while net operating revenue declined 30.4 per cent. The operating ratio rose from 67.66 per cent to 85.26 per cent. Taxes increased 30.7 per cent. Net operating income decreased from $905,160,000 to $515,793,000, or 43.0 per cent.

The rate of return on property investment in 1919 was 2.66 per cent, as compared with 5.28 per cent during the test period and 3.81 per cent in 1918. These rates are approximate, owing to the difficulty of ascertaining the amount of investment in 1918 and 1919; the investment utilized for 1919 is as of October 31, and includes the cost of allocated equipment.

Comparing the net operating income earned during the two years 1918 and 1919 with the government guarantee based on test period results, a total deficit of $601,416,000 is developed, as follows:

CLASS I RAILWAYS

Standard return (government guarantee)	$905,160,000	
Net operating income, 1918	693,111,000	
Deficit for 1918		$212,049,000
Standard return (government guarantee)	$905,160,000	
Net operating income, 1919	515,793,000	
Deficit for 1919		$389,367,000
Deficit for 1918 and 1919		$601,416,000

This is the deficit for Class I railways only, and takes no account either of smaller railways or of other transportation agencies, such as the Pullman Company, the express companies, steamship and water lines, etc. Neither does it make allowance for any increase in the guarantee for 1919, due to a return on capital expenditures since January 1, 1918. On the other hand, it does cover 18 railways of Class I that were not under federal control in 1919. Speaking generally, the inclusion of these roads does not seriously affect the results, so that they may be considered as a minimum statement of the government deficit from the operation of the larger railways for the first two years of federal operation.

It should be noted in connection with the operating expenses of 1918 and 1919 that the aggregates shown in the tables do not include the cost of maintaining the corporate organizations of the railways. This cost amounted in 1918 to approximately $10,000,000 and in 1919 to a substantial sum, the exact amount of which is not yet available. It was probably over $20,000,000.

A table included in the bulletin gives the latest available statistics of standard return as certified by the Interstate Commerce Commission or as fixed by the standard contract in the case of railways with which contracts have been executed. Parallel columns show the net operating income earned in 1919, and the amount by which it was above or below the standard return.

To the standard return shown in this table there should be added the return on new investment made in the railway properties during the years 1918 and 1919. This investment was in the neighborhood of $1,200,000,000, but it is difficult to apportion the return on the amount to the various railways, or to divide it between the two years of the period.

Revenues, Expenses and Net Operating Income, 1919 Compared with 1918 and Average of Test Period

Item	1919 (000 omitted)	1918 (000 omitted)	Test period average 1915-17 (000 omitted)	Per cent increase or decrease, 1919 compared with 1918	Per cent increase or decrease, 1919 compared with Test period
Operating Revenues	$5,184,230	$4,926,594	$3,395,231	5.2	52.7
Freight	3,556,734	3,458,191	2,380,943	2.8	49.4
Passenger	1,178,120	1,032,671	689,410	14.1	70.9
Mail	57,441	53,563	83,236	7.2	d 31.0
Express	127,664	126,232	59,891	1.1	113.2
All other	264,271	255,937	181,751	3.3	45.4
Operating expenses	4,419,989	4,017,210	2,297,162	10.0	92.4
Maintenance of way and structure	778,105	656,601	407,111	18.5	91.1
Maint. of equipment	1,232,702	1,110,280	567,665	11.0	117.2
Traffic	47,538	48,741	61,741	d 2.5	d 23.0
Transportation	2,193,264	2,056,479	1,158,763	6.7	89.3
General	125,437	112,319	82,538	11.7	52.0
All other	42,943	32,790	19,344	31.0	122.0
Net operating revenue	764,241	909,384	1,098,069	d 16.0	d 30.4
Taxes	199,194	186,966	152,427	6.5	30.7
Uncollectible	917	614	721	49.3	27.2
Operating income	564,130	721,804	944,921	d 21.8	d 40.3
Net rentals	Dr 48,337	Dr 28,693	Dr 39,761	d 68.5	d 21.6
Net operating income	515,793	693,111	905,160	d 25.6	d 43.0
Operating Ratio	85.26	81.54	67.66	....	....

d—Dercease.

Note—For the purpose of proper comparison with the test period, the operating expenses and taxes of 1918 and 1919 should be increased by the cost of the Railroad Administration, corporate expenses, and war taxes paid by the railway corporations.

New Freight Loading Reaches New Mark for Year

1920 Likely to Break All Previous Records, While Car Shortage Continues to Decrease

WASHINGTON, D. C.

A NEW RECORD for this year for the number of cars loaded with commercial freight on the railroads of the United States was set during the week ending October 9, according to reports compiled by the Car Service Division of the American Railway Association. The total was 1,009,787 cars, as compared with 982,171 for the corresponding week of 1919 and 959,722 during the corresponding week of 1918. This was the first week this year in which the freight car loading passed the million mark and represents an increase of nearly 34,000 over the week of October 2. The total of 1,009,787 for a week has been exceeded only once, according to the records of the Car Service Division. In one week of 1919 the total carloading was reported as 1,011,422. Increases as compared with the corresponding week of 1919 are shown in the Allegheny, Eastern, Northwestern, Central Western and Southwestern districts, while there were decreases in the Southern and Pocahontas districts. Increases are shown in the loading of coal, coke, ore and forest products, while there were decreases in grain and grain products and livestock and a slight reduction in merchandise and miscellaneous freight, as compared with the corresponding week of the previous year. The report for the week of October 9 follows:

*REVENUE FREIGHT LOADED AND RECEIVED FROM CONNECTIONS

SUMMARY—ALL DISTRICTS: COMPARISON OF TOTALS THIS YEAR, LAST YEAR, TWO YEARS AGO, FOR WEEK ENDING SATURDAY, OCTOBER 9, 1920

Districts	Year	Grain and grain products	Live stock	Coal	Coke	Forest products	Ore	Mdse. L. C. L.	Miscellaneous	Total revenue freight loaded: This year, 1920	Total revenue freight loaded: Corresponding year, 1919	Total revenue freight loaded: Corresponding year, 1918	Received from connections: This year, 1920	Received from connections: Corresponding year, 1919	Received from connections: Corresponding year, 1918
Eastern	1920	5,576	2,946	56,821	3,912	8,475	10,901	46,730	102,781	238,242	.....	.....	265,566	.....	.....
	1919	6,599	3,337	60,171	2,689	7,831	4,883	26,131	125,704	.....	237,345	220,495	.....	259,488	251,945
Allegheny	1920	2,395	3,959	75,259	6,639	4,167	16,121	40,068	75,667	224,275	.....	.....	146,362	.....	.....
	1919	3,359	3,535	67,422	3,907	4,458	9,952	41,941	72,611	.....	207,185	214,881	.....	150,183	179,074
Pocahontas	1920	118	358	24,674	748	1,927	262	2,778	892	38,257	.....	.....	19,499	.....	.....
	1919	168	504	24,617	600	2,009	267	128	10,246	.....	38,539	39,784	.....	20,261	25,281
Southern	1920	2,913	2,422	27,406	1,435	19,230	3,618	38,460	36,982	132,366	.....	.....	75,409	.....	.....
	1919	3,180	2,803	28,090	320	19,395	2,485	20,733	58,254	.....	135,260	122,980	.....	74,140	70,611
Northwestern	1920	14,472	9,054	11,793	1,992	14,985	44,927	29,167	39,564	165,964	.....	.....	61,922	.....	.....
	1919	14,160	10,876	14,745	756	15,202	34,355	23,382	47,376	.....	160,952	172,696	.....	65,574	85,200
Central Western	1920	10,344	12,089	27,180	521	5,735	3,049	30,834	50,816	140,568	.....	.....	73,015	.....	.....
	1919	10,725	15,260	22,522	281	6,104	2,660	24,096	56,663	.....	138,311	131,554	.....	78,857	65,428
Southwestern	1920	4,384	2,593	6,843	184	7,608	336	17,832	30,335	70,115	.....	.....	53,112	.....	.....
	1919	4,607	3,392	7,050	102	6,759	248	12,826	29,595	.....	64,579	57,332	.....	52,010	47,158
Total all roads	1920	40,302	33,431	229,976	15,431	62,127	79,214	205,869	343,437	1,009,787	.....	.....	694,885	.....	.....
	1919	42,798	39,707	224,617	8,655	61,758	54,950	149,237	400,449	.....	982,171	.....	.....	700,513	.....
	1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	959,722	.....	.....	724,697
Increase compared	1919	.....	.....	5,359	6,776	369	24,264	56,632	.....	27,616	.....	.....	.....	.....	.....
Decrease compared	....	2,496	6,276	.....	.....	.....	.....	.....	57,012	.....	.....	.....	5,628	.....	.....
Increase compared	1918	.....	.....	.....	.....	.....	.....	.....	.....	50,065	.....	.....	.....	.....	.....
Decrease compared	1918	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29,812	.....	.....

*L. C. L. merchandise loading figures for 1920 and 1919 are not comparable, as some roads are not able to separate their L. C. L. freight and miscellaneous of 1919. Add merchandise and miscellaneous columns to get a fair comparison.

The year 1920 promises to break all previous records for the volume of freight transported by the railroads, in spite of the unfavorable conditions caused by the strike which affected the performance of the early part of the year. The Interstate Commerce Commission has issued statistics showing that the number of net ton miles of freight handled during the first seven months of the year was greater than for the corresponding period in previous years. In a recent statement it also said that during the past four years the net ton-miles for the first seven months were 56.46 of the total for the full year and that, assuming that this percentage will be maintained in 1920, the year's figures for the volume of freight will far exceed all past records. While the net ton mile figures are available only for the first seven months of this year, an index to the amount of freight traffic is available in the revenue car loading figures compiled each week by the Car Service Division. It so happens that a new week began on August 1 this year and the car loading figures now available show that from August 1 to October 9 there were loaded 9,637,941 cars of commercial freight, as compared with 9,351,416 in the corresponding weeks of 1919 and 9,590,090 in 1918. While these figures are not so exact as the ton-mile figures, since they do not take into consideration either the length of haul or the average car load, it is known that both the average haul and the car load have been increasing, and it is, therefore, believed that when taken into consideration with the earlier figures of the Interstate Commerce Commission, they show that the freight traffic this year so far has been greater than ever before. The year 1918 has been the record year heretofore, in point of net ton-miles, although it was only 2 per cent greater than 1917, but the actual tonnage handled was greater in 1917, the average haul having increased in 1918. While there has been a falling off in industrial activities which has reduced the volume of miscellaneous freight somewhat, there is still a large tonnage of coal, grain, cotton and other materials to be moved.

In spite of the fact that the volume of freight traffic continues to increase, according to the latest reports, the car shortage is being steadily reduced. For the week ending October 8, although more new freight was accepted by the railroads than in any preceding week this year, the average daily deferred car requisitions showed a further reduction to 75,336, as compared with 80,141 the week before. Of the total 36,261 were box cars and 25,914 were coal cars. The car shortage had increased from about 80,000 at the beginning of the year to 146,070 in the week ending September 1, but each week since has shown a reduction, as the congestion has been cleared up and the railroads were enabled to increase the efficiency of car movement.

Car Shortage Reduced

The freight car accumulations for the week ending October 15 showed a slight increase as compared with the preceding

week to a total of 43,616 cars, of which 17,390 were held for export and coastwise movement. These figures apply to commercial cars. The number of cars held under load with company material shows a further reduction to 37,688.

The Use of Priority Under Service Order No. 21

In supplement No. 2 to Circular CSD-88, the Car Service Division says that many receivers of coal, public utilities and others, who may, in an emergency, become beneficiaries of Service Order No. 21, also some railroads, apparently are under the impression that priority service may be invoked under Order No. 21 in the first instance. This is not the case; it is earnestly desired, in protecting these requirements, to avoid altogether the use of assigned cars, if possible.

The plan is:

1. The Car Service Division will undertake to provide maximum supply of open top cars to coal loading railroads.
2. Maximum car supply having been provided to mines it is expected that contractors of coal to users of a public service character, as enumerated in Service Order No. 21, will fill all such shipping orders from distributive share of current car supply. In instances where the aggregate public service commitments of such supplies make this impossible, the National Coal Association, member of the committee named in Supplement 1, will undertake to procure for the public utility the coal essential to its operation, but not for storage.
3. In certain instances, but after all other means for procuring requisite coal have failed, a super-assignment of cars in behalf of the public utility in distress, as contemplated in Service Order No. 21, may be recommended by the committee to the Interstate Commerce Commission for the issuance of a priority order in the individual case.

As stated in Supplement 1 to CSD-88, gas and electric service utilities including street railways who, after exhausting all resources to obtain by voluntary shipment sufficient coal to meet their daily requirements will apply to the National Committee on Gas and Electric Service, Washington, D. C., for assistance.

Originating railroads themselves, in circumstances requiring it, will, on their own initiative, act in behalf of other consignees who are within the classes named in Service Order No. 21 and will approach the supplier in an effort to obtain shipments of the requisite tonnage without recourse to assigned cars. Failing to so obtain shipment of the coal the railroad will handle direct with the Car Service Division such instances as may require attention by the Washington Committee, or ultimately by the Interstate Commerce Commission under Service Order No. 21, and in so proceeding should develop information solicited by the accompanying questionnaire which is an adaptation of the questionnaire form distributed by the National Committee on Gas and Electric Service to gas and electric service utilities, including electric street railways.

Coal Production

For the third consecutive week this year the railroads have furnished transportation enough for the production of over 12,000,000 net tons of bituminous coal, according to the reports of the Geological Survey for the weeks ending October 9 and 16 and estimates made by the railroads for the week of October 23. The total output of soft coal during the week of October 16 is estimated by the Geological Survey as 12,135,000 net tons, an increase of 44,000 tons over the previous week and with two exceptions the greatest ever recorded. For last week the production is estimated at a still greater figure. The soft coal produced and transported during the first 246 working days of this year has been 428,339,000 net tons, which is nearly 52 million tons ahead of 1919 although about 44½ million tons behind 1918 when the production exceeded consumption and provided for a net addition to consumers' stocks of approximately 30 million tons. A production of 12,143,000 tons was attained in early December, 1917, and in the last week before the strike of 1919 the output was 13,140,000 tons.

Continued recovery in the movement to the lakes brought the dumpings for the week ended October 16 up to 1,104,384 tons. With the exception of the last week of August this was the best performance of the year. The cumulative lake movement from the beginning of the season now stands at 17,824,000 net tons, as against 25,309,000 in 1918 and 20,743,000 in 1919. On October 19, there were 11,004 cars of soft coal at the lake ports awaiting dumping, a figure greater than normal.

Commissioner Aitchison of the Interstate Commerce Commission on October 22, in a letter to H. M. Griggs, manager of the coal and ore exchange at Cleveland, gave authority to omit allotments under Service Order No. 10, the northwest priority order, against mines in the following districts, until further advice from the commission:

1. Mines upon the Louisville & Nashville.
2. Mines in the Irwin gas coal district or basin.
3. Mines in the northern Ohio districts, the middle districts of Ohio, lying between No. 8 group and the Great Lakes, including Coshocton, Berkholtz and Massillon, and Goshen, Salineville and Tuscarora; and also the Butler-Mercer districts in Pennsylvania.

In addition, allotments may be omitted against wagon mines and mines producing stripper coal until further advice from the commission. In another letter on October 25 Commissioner Aitchison authorized the omission of allotments of cars against the Toledo & Ohio Central and Kanawha & Michigan railroads until further advice.

Service Order No. 10 Suspended

Because of the general improvement in the coal situation and also because of the accumulation of coal at the lake ports, which has reached a total of over 12,000 cars, while there have been complaints of shortage in Ohio, Indiana and Michigan for domestic purposes, the Interstate Commerce Commission on October 27 suspended, until further order, its Service Order No. 10, entered July 20, 1920. That order was designed to give a preference in the use of coal cars to Lake Erie ports with the primary object of conserving equipment and movement needed to get an adequate supply of bituminous coal to the Northwest, by requiring a full utilization of the rail and lake routes during the season of open navigation. Simultaneously and continuously, a vigorous effort has been made to increase the supply of cars available for the loading of coal, which has been so successful that while during June the ratio of cars supplied to cars ordered was 62.2 per cent, it was in July 74.7 per cent, August 80 per cent and September 85.6 per cent. The following statement shows the daily average numbers of cars at the ports, and of cars dumped:

	Average at Port	Average Dumped
July	5,617	2,198
August	9,212	3,457
September	7,670	3,288
October 1 to 26	9,412	2,868

"The demand for coal at the Lake Erie ports for transshipment by water to the head of the lakes is now less than at any time since Service Order 10 was promulgated," the commission said in a statement. "As a result there are extensive accumulations of coal at these ports and a large volume en route. Up to October 26 there had been actually dumped into vessels at the lower lake ports 18,572,518 tons, with 580,000 tons in cars at the ports awaiting dumping and approximately the same amount en route. We are assured that the customary lake suppliers will continue to ship their commitments to the lower lake ports for transshipment without preference order from the commission. This year an unusually large amount of coal has already been moved to the Northwest by the all-rail lines. . . ."

Bridge and Building Men Meet in Atlanta

Convention Characterized by Large Attendance, Practical Reports and Active Discussion

THE THIRTIETH annual convention of the American Railway Bridge and Building Association met at the Piedmont hotel, Atlanta, Ga., on Tuesday, Wednesday and Thursday of this week. The convention was one of the most successful in the history of the association. Over 250 members were in attendance, those from Chicago and points north and west coming on a special train of eight sleepers via the Big Four and Southern railways.

The officers of this association during the past year were: President, Fred E. Weise, C. M. & St. P. R., Chicago; First Vice-President, W. F. Strouse, Baltimore; Second Vice-President, C. R. Knowles, I. C., Chicago; Third Vice-President, A. Ridgway, D. & R. G., Denver; Fourth Vice-President, J. S. Robinson, C. & N. W., Chicago; Secretary-Treasurer, Cal. A. Lichty, 319 No. Waller Ave., Chicago. Executive members: J. I. Wood, P. M.; A. B. McVay, L. & N.; J. H. Johnston, G. T.; E. T. Howson (*Railway Age*); C. W. Wright, L. I.; G. A. Manthey, "Soo."

The convention was called to order by the president at 10 o'clock Tuesday morning, and was opened with prayer by C. A. Lichty, secretary. The members were welcomed to Atlanta by James L. Key, mayor of the city, and Eugene Black, president of the Chamber of Commerce. E. T. Howson (*Railway Age*), replied to the welcome on behalf of the Association.

In his opening address, President Weise referred to the problems now confronting the members of the Association in rehabilitating the roads and in resstablishing the proper morale among their employees. He also emphasized the necessity for more permanent construction to reduce maintenance costs. In closing, he referred to the death of three past-presidents since the last convention, J. H. Cummin (L. I.), B. F. Pickering (B. & M.) and A. S. Markley (C. & E. I.).

The report of the secretary-treasurer showed $1,300 on hand, and a healthy increase in membership during the year.

Report on the Abuse of Treated Material

The purpose of treating timber is to prevent decay and extend the life of the timber. This result is usually accomplished by impregnating the timber with a preservative of some kind, creosote oil being generally used for bridge timbers and timber used in similar structures. The efficiency of the treatment is depended upon and is usually measured by the depth of penetration and the extent to which the untreated portion of the timber is sealed against decay by the treatment. It is obvious that anything done to the treated timber which tends to lessen the thickness of the treated area is abuse and destroys the effect of the treatment to the extent that the treated area is reduced. If the timber is cut or sawed until the untreated timber is exposed, decay will be practically as rapid and will do as much damage as if the timber was used without treatment. While it is a recognized fact that it is often necessary to cut or frame treated timber after treatment, much of the framing can and should be done before the timber is treated and whenever it is actually necessary to frame treated timber care should be exercised to see that the work is done in an intelligent manner and with as little damage to the treatment as possible and that hot creosote oil is applied to the cut portion.

A few examples of the proper treatment of treated material follow:

1. When treated piles are cut off after driving, the tops of piles should be thoroughly coated with hot creosote oil. It is not enough to paint the tops but oil should be applied as long as the timber will take it.
2. When boring holes in treated material, holes should be made slightly smaller than the bolts so that a driving fit will be obtained. It is still better to pour hot creosote oil in the holes before driving the bolts.
3. Where piling is not in proper line after driving, a treated pile should never be adzed to make the bracing fit up, but if the piles are greatly out of line blocks should be applied to the piling to bring the bracing in line. In extreme cases it may be necessary to place lap bracing instead of bracing extending clear across the bent.
4. The end penetration on a well-treated timber is usually from 3 to 6 inches in depth. Therefore, an inch or so sawed from the end of a well-treated timber will not materially affect the life, but any framing of treated timber that penetrates the area of treatment certainly tends to destroy the effect of the treatment.

The following instructions should be observed in handling creosoted timber:

1. In unloading creosoted timber care should be taken to see that it does not drop from too great a height to the ground, as it has been found in a great many instances that heavy timbers are broken or cracked, which is no doubt due to the manner in which it was unloaded. Treated timber is more susceptible to damage from this cause than untreated timber on account of the lessened strength of the timber through treatment.
2. Creosoted material should not be mistreated with bars, picks, cant or lug hooks in such a way as to make holes extending through the treatment.
3. In cutting off the piles the tops should be thoroughly covered with hot creosote oil. Better penetration can be obtained by boring holes in the heart of the piling and filling with hot creosote oil. All exposed cut surfaces should be thoroughly covered with hot oil.
4. In placing sway bracing on bents it is often the practice to cut away piles so that the brace will give more satisfactory bearing. The treated piles should not be cut away to make the bracing fit up, if possible to avoid it, but if piles are greatly out of line blocks should be applied to bring the bracing in line. Where necessary to cut the piling the exposed surfaces should be covered with hot creosote.
5. Frequently holes are bored in treated timber and left unfilled. These holes should always be plugged with plugs of treated timber.
6. In general all portions of treated timber which have been cut or bored below the penetration of the creosote should be covered thoroughly with hot creosote oil.

A. J. James (A. T. & S. F.), chairman; S. L. McClanahan, J. S. Huntoon (M. C.), F. A. Taylor (B. & O.), F. L. Thompson (I. C.), H. von Schrenk, committee.

DISCUSSION

The discussion of this report centered largely about the use of galvanized iron sheets over caps and stringers to protect them against decay. H. McDonald (N. C. & St. L.) described the excellent results secured on that road extending over a period of twenty years. Others described adverse experiences with this form of construction because of the lodgment offered for sparks. G. W. Andrews (B. & O.)

urged anticipation of requirements for treated timber in order that it can be cut to desired sizes before treatment, and the application of hot creosote to these surfaces which it is necessary to cut in the field. The discussion was concluded with the presentation of moving pictures showing the treatment of timber.

The Use of Electricity for Pumping Water

By C. R. Knowles
Superintendent Water Service, Illinois Central

While electricity has been employed to some extent as power for pumping at railway water stations for many years its use has not been general. It has long been apparent that electricity had its advantages for this class of service, but up to the past few years current has not been available at many outlying stations and where current was available the rates were often so high that there were but few places where electric power would show a saving in operation over steam or gasoline. Within recent years the production of electricity for commercial purposes has increased greatly and the extension of power lines has made it available at many points on our railroads at rates sufficiently attractive to warrant serious consideration, with the result that there has developed a considerable use of electric motor drive for pumping plants at water stations.

A motor-driven pumping plant with automatic pressure regulator or float switch control is specially suited to locomotive water tank service at many points because the tank may be kept full, regardless of variations in the demand for water, without any attention other than a periodical inspection of motor control and pump. It is also practical in some installations to have the station agent or local employee start and stop the pump by a remote control switch or push button. The standard control equipment now on the market is reliable and can be depended upon for pumping station service.

The cost of electric power for pumping is usually lower than the cost of fuel that would be required by a steam plant, as the coal consumed at the average railway water station is from 4 to 6 times that necessary to generate the electricity required to pump the same amount of water. This is accounted for by the fact that with a steam plant there is a loss of fuel in getting up steam, banking fires, etc. Also as a general thing the pump in the average railway water station is not as efficient a machine as the large steam turbines commonly used in central power stations. Electric motor driven pumps have an added advantage over steam in lower first cost, and lower maintenance, while they are more compact, cleaner and easier controlled. An important factor in the comparative cost of a steam and electric plant is the housing. An electric pumping plant will require a building approximately one-third the size of that required for a steam plant of the same capacity. On the other hand, the difference in the cost of pumping by steam and by electricity is offset to some extent by reason of the current having to be carried over a transmission line with resultant line losses, together with the cost of construction and maintenance of power lines. Electric power also has a disadvantage where pipes and pumps are exposed to freezing temperatures since it is necessary to provide some method of heating the plant and where extremely low temperatures prevail constant attendance is often required to keep it from freezing during the winter months. Another point to be considered is the question of electric service interruptions due to storms or other causes. While the motor itself is reliable and can be further protected against failure by installing duplicate units it is not a prime mover and unless more than one source of power is provided it is liable to failure through interruption of power supply. This is particularly true where the source of power supply is from a small or heavily loaded plant where trouble may be expected from variable voltage or frequency. Electric drive is adapted to all types of power pumps, especially the centrifugal type, as the motor can be connected direct to a centrifugal pump without belts or reduction gears.

The convenience and simplicity of a direct-connected motor and centrifugal pump make it one of the most desirable installations for tank service under conditions within the limits of centrifugal pump operation. Recent installations have consisted largely of this type of pumping unit, but failure to realize the limits of a centrifugal pump has unfortunately resulted in some unsatisfactory installations.

Discussion

The discussion consisted of questions regarding unit costs of electric power and also concerning limits of operation of centrifugal pumps. The chairman replied that each installation must be designed on the basis of local conditions.

Report on the Repair and Maintenance of Tank Hoops

Few roads seem to have uniform or standard instructions for the inspection of tank hoops, especially flat ones, and the hoops are seldom removed unless they show some indication of weakness on the outside surface when the tanks are painted. It is almost the general practice for the supervisor of bridges and buildings or the water service foreman to make a superficial annual inspection of tanks.

Only two lines were found to have specific instructions for the removal of flat hoops for inspection. These instructions require the removal of all hoops every year in one case and every two years in the other case, at which time all hoops are scraped and painted and all necessary repairs or replacements taken care of.

A great variation in the intervals at which tanks and tank hoops are painted is found on various lines, ranging from every two years to every eight years, while many roads report that tanks and tank hoops are painted when needed. This emphasizes the necessity and value of careful and intelligent inspection.

Of the 45 lines reporting on this subject, 25 have practically adopted the use of round or half round hoops and report that they are far superior, the advantage being that a more satisfactory and thorough inspection or examination can be made of the hoops. Much less surface is exposed to the weather and other injurious elements; they can be drawn up more readily; they are provided with more convenient and substantial connections, and from experience have been found to last longer. In fact, it is stated that they will last as long as the tank under any conditions.

The use of chafing irons between the hoops and tank staves at the connections has been found of great benefit. They are usually made of the same dimension material as the hoops and from 28 in. to 40 in. in length.

The repair of tank hoops is taken care of effectively, generally, by the replacing of hoops or parts of hoops with new or good second hand ones. When the entire set of hoops on a tank has deteriorated to a point where they still have a fair margin of safe life left, the element of chance may be eliminated by placing additional hoops, which is often done. When hoops or parts of hoops are replaced, the hoops removed can be taken to the shop and in many cases repaired if they are not too badly deteriorated, thus providing repair parts.

F. A. Benz (B. R. & P.), E. C. Zinsmeister (B. & O.), C. W. Wright (L. I.), G. W. Welker (Sou.), J. H. Grover (A. T. & S. F.), A. W. Smith (C. N.), J. L. Winter (S. A. L.), committee.

Discussion

The discussion centered mainly on the relative merits of round and flat hoops, it being maintained that round hoops

crushed the timber and promoted decay. C. R. Knowles, Illinois Central, and others favored the round hoop because of the decreased breakage and said that they found no evidence of injury to timber.

Report on Spray Painting

Painting by spraying, with air pressure, has been in use for a long time, but it has not come into general practice principally for the reason that considerable equipment and skilled operators are necessary for successful work and even then it is used comparatively little except in the case of walls having large areas, box cars and other cars, etc. With special apparatus and skilled help some workmen become quite proficient in this method of applying paint and it is claimed by many that it is more economical to use the spray than to paint by hand. In most instances there is some waste of paint, by spraying ranging from zero up to 10 per cent or perhaps even more, while most users claim a saving of 50 to 75 per cent in labor by aid of the apparatus. In both instances the results will depend on the skill of the operator. Most of those who have had charge of the spray method of applying paint and have given it a thorough test with the more modern apparatus speak in its favor and claim that very satisfactory results may be attained; again, there are some who have used the method for years who state that the results are more often unsatisfactory.

There is no doubt but that the most satisfactory and economical results are attained where a good quality of paint of the proper consistency is used in connection with the best apparatus in the hands of a skilled operator, but this is true of anything. One man with the same materials and same kit of tools will produce far better results than another man; and more especially is this true where slightly complicated apparatus is used.

Discussion

In the discussion a number of members stated that spray painting is economical with experienced operators, the waste in paint being more than overcome by the reduction in labor.

On Tuesday evening Mars Johnson, assistant engineer, Illinois Central, presented a paper describing the erection of the St. Charles Air Line bridge, Chicago, illustrated by motion pictures. Hunter McDonald, chief engineer, Nashville, Chattanooga & St. Louis, presented a paper on housing and the feeding of maintenance employees which will be abstracted in a later issue. J. K. Melton, official photographer, Illinois Central, presented motion pictures of various bridge work.

H. C. Boyden, of the Portland Cement Association, presented on Wednesday morning a paper on the proper proportioning of concrete mixtures, in which he described the results of recent experiments to determine the effects of fineness and quality of sand, character of stone and manner of mixing to secure the strongest concrete.

Report on the Maintenance of Timber Docks

The maintenance of timber docks is a pertinent subject at this time, owing primarily to the recently greatly enhanced value of timber, the difficulty of securing it and the very high cost and inefficiency of the labor used in applying it. Frequent inspections should be made in order to obtain the longest service from the timber without permitting the structures to become unsafe for use. The men who make the inspections should be of wide experience and sound judgment, for upon their decision rests the responsibility for the expenditure of large sums of money. Quite often the difference between safely-deferred repairs or immediate repairs, will be the difference between a reasonable return on the capital represented by the value of the structure and no return at all. On the other hand it may be a matter of economy to overhaul the dock at regular intervals and put it in condition at such times to last the period before the next regular time for repairs. It would seem to be the part of good practice, on docks which are in constant operation, to endeavor to obtain all the life possible from all parts of the dock by close inspection and the employment of small crews continuously. In docks of seasonal use like the great ore and coal docks of the upper lakes, repairs are ordinarily made during the winter to carry them through the next shipping season, and consideration cannot always be given to securing all the life of the timber which would become worn out before the next regular time of repairing. On docks of this sort large repairs can usually be deferred until winter with great advantage.

The maintenance of docks which are in continuous operation is ordinarily more difficult and more expensive than of docks which are in seasonal operation only. In the first case, the dock must be kept in such condition as to not unduly interrupt the regularity of its operation, resulting in delays in the work of repairing it and often requiring the shifting of repair crews, while in the latter case, docks which are of seasonal use can be abandoned entirely to repair crews and the work handled without interruption. This is particularly true of the ore docks located on the upper lakes where the traffic is so great during the season of navigation that only emergency repairs can be made when the docks are in operation. It is the custom there to thoroughly overhaul them during the winter and put them in shape for an entire season's business. There can, however, be no set time as each class of dock is a problem by itself and the time for repairing it calls for the exercise of rare good judgment by the maintenance officials in charge, taking account of the labor and material situation, as well as traffic and other matters affected by it. It can be stated though that, other conditions being equal, summer work will be found to be less expensive than winter work, especially in the more northerly latitudes of this country.

Consideration should always be given to the use of timber for repairs which grows contiguous to the railroad; even though the timber may not have the lasting qualities of that used in the original construction; provided it will last the remaining life of the dock. This is good business for the railroad, aside from the matter of maintenance. It should be the aim, so far as possible, in making repairs, to maintain all parts of the structure so that they will approach the state of obsolescence together. This can often be accomplished by taking material replaced at points subjected to very hard wear and using it in other places where the service is not so severe. Long piling in deep water which has become broken or decayed at the top, but which is sound under water, can often be pulled, cut into shorter lengths and re-driven in more shallow water. Decking in driveways, which has become worn and unsafe for heavy loads, can, when replaced by new material, be used in other places less exposed to wear. Timbers which have become decayed at the ends can be shortened into sound lengths and reused. It is well to maintain sizable stocks of timber taken from dismantled structures for use in repair work of like structures.

On docks of any considerable size, some equipment is necessary to make emergency repairs. Although large general repairs are frequently let out to a contractor who furnishes his own crews and equipment, there are many accidents on a busy dock that cannot await the delay of securing a contractor to do the work. Depending upon the character and extent of the dock, this equipment may consist of cranes, derricks, pile drivers, etc., mounted on trucks or skids for land work and on scows for work around the water fronts of the dock. Floating drivers and derricks should be equipped

with pumps, hose and jet for use in driving and pulling piles. A very good arrangement is to use a long scow, with pile driving leads on one end and a stiff-leg derrick on the other end, both operating from a hoisting engine placed at the center of the scow on a reversible platform or circular track, so that the engine can be faced in either direction to operate either the pile driver or the derrick as the case may be. A swinging engine may be placed upon the derrick end of the scow to be used in swinging the derrick boom.

Owing to the members of the committee being so widely separated, and the impossibility of getting them together for a general study of the subject, special types of docks were assigned to each individual for a special investigation and report. Special reports were presented on the (1) maintenance of timber ore docks at the Great Lakes, by R. C. Young, chief engineer, L. S. & I., and by L. J. Anderson, supervisor of bridges and buildings, C. & N. W. (2) The maintenance of timber coal docks on the Great Lakes, by F. N. Graham, assistant engineer, D. M. & N. (3) The maintenance of timber docks on the Pacific Coast, by H. A. Gerst, assistant bridge engineer, G. N., and by T. W. Bratten, supervisor of bridges and buildings, S. P. (4) The maintenance of salt water docks on the Atlantic Coast, by B. W. Guppy, engineer of structures, B. & M. (5) The maintenance of timber merchandise docks on the Great Lakes, by W. J. O'Brien, district carpenter, C. M. & St. P. (6) The maintenance of timber docks on the Gulf Coast, by A. J. Catchot, supervisor of bridges and buildings, L. & N.

The committee consists of the above members with F. C. Baluss, engineer of bridges, D. M. & N., chairman.

Report on the Maintenance of Bridges During Filling

When construction work on a new line of railroad is begun every possible effort is made to expedite the laying of the track in order to permit the operation of work trains for the handling of men and materials and thereby hasten other construction work, and also to permit the operation of revenue trains. In order to accomplish this more quickly waterways, ravines and various depressions are crossed by means of timber trestles, which are then used as long as they can be maintained economically. The timber trestle has the advantage that it can be built quickly and time is available during its life to enable a study of the situation to be made in order to determine the type of permanent structure that should be built for the necessary waterway or other opening. Wherever possible, timber trestles are replaced by earth embankments because this forms the most efficient roadbed. Thus it is that almost all railroads have programs of bridge building each year.

It is sometimes possible to begin the filling within a year or two after the pile or timber trestle is first built by putting in from 18 to 24 in. of earth in ravines each year, thereby gradually filling the opening and also serving the further purpose of preserving the piling, which rots at the ground line, by carrying this line a few feet higher up on the pile each year before decay has had time to injure it. When this method can be followed the structure will not be disturbed during the process and no extra precautions need to be taken.

In cases where the filling must be done more rapidly, it is necessary to take precautions to see that the bridge structure is at all times safe for the operation of trains. Before the filling is begun the structure should be gone over carefully and, if necessary, strengthened, and as many of the longitudinal members as can be spared should be removed as the work progresses, as they are in the way of filling material. As the filling material is placed, it should be spread uniformly around and under all parts of the structure and compacted as thoroughly and evenly as may be between the trestle bents to avoid crowding them out of line. It has been recommended that, as this material is spread, the outer edges should be kept higher than the center to prevent the washing of the slopes, and also to aid in the settlement of the filling, but whether this need be done or not will depend largely upon the nature of the filling material. The material used for filling may have much to do with the progress of the work; in some cases it may be best to fill the trestle partly and allow several months to elapse for the settlement of this portion before proceeding with the balance.

There are various methods of filling bridges and the one to be used will depend upon local conditions, such as the topography at the bridge site and the accessibility of suitable filling material. The best kind of filling material is that which will pack solidly, is not liable to slip or slide, and will not wash away easily during heavy rains. The distance from the bridge to the location of suitable filling material will largely determine the method to be employed. If suitable material can be obtained from borrow pits adjacent to the bridge and the topography of the ground permits it, the best method of filling is by team, because in this way the accumulation of earth around the trestle bents is comparatively slow, it can be properly distributed to avoid disturbing the bridge structure and the men and horses employed in handling the earth do much to compact it in passing over it.

Usually suitable material must be hauled from a distance. If this distance is not too great, the material can be handled by dump cars operated on a temporary track, built parallel to the operated track, and the cars may be loaded by steam shovel or drag line and hauled to the bridge by horses or small engines. If the distance is too great for this, the material is usually loaded into railway cars by a steam shovel, hauled to the bridge by train and dumped through the bridge structure. There may be situations in which the lower part of the filling can be placed by teams and the upper portion by train but, as stated before, this will be determined by local conditions. In other cases also bridges may be filled by wasting the material secured from ditching operations or the waste from mines or other industries; at other times a gradual filling of trestles is brought about by the accumulation of city refuse, cinders, slag, etc. In mountain districts it is sometimes possible to fill trestles by the hydraulic or sluicing method, and when this can be done it is very satisfactory and economical.

F. Gable (P. & R.), chairman; J. F. Pinson (C. M. & St. P.), W. B. Harris (M. & O.), W. E. Burns (S. P.), G. A. Manthey (D. S. S. & A.), R. J. Bruce (M. P.), C. E. Smith, A. S. Clopton (M. K. & T.), committee.

Report on the Maintenance and Repair of Freight House Floors

One of the prime needs in a modern freight house, especially where much trucking is done, is a smooth floor, and one of the perplexing problems of a building supervisor is to keep this floor smooth at all times.

Floors may be classified according to the materials of which they are constructed into the following types: A—Wood floors of plank or flooring in which the grain of the wood is parallel to the floor surface. B—Wood floors covered with metal plates. C—Wood blocks or paving in which the grain of the blocks is at right angles to the floor surface. D—Brick, such as are used for sidewalks and street paving. E—Asphalt or mastic. F—Concrete. Concrete is frequently, if not usually, used as a sub-base or foundation for some of the other kinds of floors.

A yellow pine floor is more widely used than any other type, and considered from the point of first cost only, is the cheapest floor that can be constructed, particularly in a timber country. It can be used to advantage where trucking is not heavy, and in new buildings where deep filling is required in-

side the foundation where settlement is likely to occur. Long leaf yellow pine is preferable to short leaf and has a probable life of 8 to 12 years, depending upon the character of traffic. Repairs can be made readily to yellow pine floors and when planks are broken or damaged, they can be removed and replaced easily, but after the floor is worn considerably, this results in an uneven floor. It is possible after such a floor is considerably worn to take up the planks and relay them with the bottom side up, using shims to secure an even bearing on the joists.

Hardwood floors of maple, beech and birch have been used extensively for years as a top finish wearing surface upon a sub-floor of yellow pine or other similar wood. This is particularly true of maple, which makes a very serviceable and durable floor. Sometimes this type of floor is built on a concrete foundation, in which case the underfloor is nailed to nailing strips embedded in the concrete. It is recommended that the flooring strips or screeds be of creosoted material because experience has shown cases in which they have rotted and could not be easily replaced.

The Soo Line, the Illinois Central, the Pennsylvania, the Missouri Pacific and the Grand Trunk have maple floors in service, with an average life of about 20 years, and the Missouri Pacific has quoted a maximum life of 30 years. There is no record of any railroad having used a hardwood finish without a sub-floor, but it is suggested that this might be used in places where water is on the floor frequently. Decay develops quickly in double floors subject to such dampness and it is thought that a heavy single hardwood floor will outlast a double floor on account of the elimination of such decay. In order to overcome dry rot in double floors on sleepers or concrete foundation it is necessary that no accumulations of dust or rubbish be allowed and the floor should be so constructed as to allow for the circulation of air. A floor of matched lumber is not as easily repaired as the other type because the strips of flooring cannot be taken up without damaging the tongue and groove.

The Illinois Central has used maple flooring for freight houses for many years. This flooring is end matched only, the sides being left square and is about 3 in. wide. If laid on a concrete base, 2 in. by 4 in. screeds are imbedded in the concrete, on top of which is placed a deck of 2-in. lumber, varying from 2 in. by 6 in. to 2 in. by 10 in., preferably creosoted and thoroughly nailed to the screeds. The maple flooring is then laid at right angles to the 2-in. plank, and thoroughly face nailed, spacing the nails near the edge of the flooring. This, together with the end matching, forms nearly as smooth a floor as though it were matched and without question is longer lasting. It also saves one-half inch on every piece that is taken up by the matching. No warping has been observed and no more trouble from bulging on account of the absorption of moisture than with the edge matched floor.

Investigation discloses comparatively little use of floors covered with metal plates in railway freight houses. Where used they are largely runways where the trucking is unusually heavy and good service is reported. If plates are used they should be roughened or corrugated to afford a foothold for the men.

A wood block floor is one in which the wearing surface consists of small blocks so laid that the grain of the wood is at right angles to the floor surface. In order to insure a satisfactory wood block floor, a good concrete or other solid and substantial foundation is necessary. This type of floor is resilient, smooth, easy for trucking, readily repaired, dustless, has long life and entails a low maintenance cost. It will not, however, stand exposure to weather, and, as a general rule, repairs leave an uneven surface. Wood block floors are divided into two classes: untreated and creosoted.

Untreated wood block floors can be used to advantage where delicate merchandise is handled. The blocks should be placed on a ¾ in. or 1 in. sand cushion and the joints filled with 1 to 1 cement mortar or laid on a pitch base and the joints filled with asphalt. The sand or pitch acts as a cushion for the blocks and insures an easy working floor. Care should be taken that this floor is not exposed to the weather, as water may cause it to buckle.

Floors of this type are easily repaired by removing worn or damaged blocks and replacing them with new material. However, when such repairs are made it produces a very uneven wearing surface which, at times, might have a tendency to damage fragile merchandise or packages in trucking.

Creosoted wood block floors are laid similarly to the untreated wood block floors and have practically the same characteristics. They have been installed for 10 years or more, and are giving exceptional service. The main objection to creosoted wood blocks in freight stations is that the creosote taints certain kinds of merchandise, such as flour, butter, etc. At points where these commodities are not handled, it is considered an ideal floor. Blocks should be especially treated for interior use inasmuch as paving blocks for street use have proven unsatisfactory. Trouble has been caused from time to time by shrinkage and expansion, and it is recommended that in dry locations blocks should be well seasoned, while green or semi-air dried blocks are preferable for damp or moist conditions. Repairs are easily made the same as for untreated wood block floors.

Brick floors do not seem to be desirable for freight houses. The general opinion among railroads as to this type of floor seems to bear out the following facts, viz.: it is a strong, durable floor with a low maintenance cost, easily cleaned and sanitary, but it is not adapted to easy trucking, is a hardship on the truckers' legs and feet, and is very noisy. It is brittle, so that it chips and breaks easily, and is unyielding so that falling packages of delicate or fragile character are often damaged. Brick floors are recommended for storage warehouses or freight houses which are subject to damp conditions and for the storage of oils, paints, greases and other volatile and inflammable materials on account of the fire-resisting qualities of the brick. Brick floors should have a good concrete foundation with a sand cushion.

Opinions on asphalt mastic floors show a great deal of divergence. Theoretically it should make an ideal floor, but this is not always borne out in actual experience. The manufacturers of this flooring material contend that it is an ideal floor when properly laid for shops and freight houses, floors of this material being in service after 25 years of use and abuse. They further claim this material will outwear other floors several times, is easy to walk and truck over, becomes denser under heavier traffic, will not wear uneven, crack or disintegrate, is noiseless, dustless and easily cleaned, is sanitary, waterproof and fire-resisting, and above all, is easily repaired. Workmen comment that the mastic floors are non-slippery in dry weather but are not in great favor due to excessive wear on shoes, which is about 100 per cent more than on wooden floors.

Floors of asphalt or mastic are probably more easily repaired than any other kind. If a hollow place or hole develops it is repaired by removing enough of the top layer until all of the surrounding surface is on a level plane. New asphalt or mastic is then applied and finished as in the original floor. There seems to be no difficulty in securing a good bond in this case because the material is applied in a fluid or semi-fluid state, usually hot. Should mastic flooring be damaged by accident or by loading on points, a perfect and invisible patch can be made over the spot so injured, repairs being made over night and not being detectable after a short time. As soon as mastic floors become worn in certain parts more material can be added and the floor brought up to its original thickness.

Asphalt block has only recently come into use for freight

house floors and very little data are available regarding them. The manufacturers claim for them a life of 30 years. The blocks are laid like wood blocks, or brick, in a mortar bed on a concrete base. No expansion joints are needed and the floors will stay smooth without heaving. The wear is slow and, it is claimed, no chipping or spawling will occur. It forms a floor which is noiseless, dustless, waterproof, odorless and sanitary. Repairs are easily made by removing such blocks as may be defective or damaged and replacing with new blocks. It is assumed, however, that when this type of floor is patched or repaired in small areas, the floor will present an uneven surface which is not desirable.

Concrete floors are cheap and fairly permanent, are sanitary, easy to clean and require no special foundation. It is becoming a general practice of late to reinforce concrete floors, but this does not add materially to their life except on filled or new-made ground where it might afford some advantages. A concrete floor, as a rule, is dusty, noisy, hard on truckers' legs and feet, is easily damaged by falling packages and merchandise, becomes soft and worn in spots, which eventually develop into large holes and uneven surfaces, is subject to surface cracks due to temperature changes, and breaks up under the impact of truck wheels. For these reasons the maintenance cost is high and this type of floor does not compare favorably with other floors. Great care should be exercised in laying concrete floors so as to overcome the above disadvantages and difficulties as much as possible.

The reinforcement of the top of a concrete floor with triangular mesh will tend to harden the top surface and prevent hair and seasoning cracks, and thus prolong the life of the wearing surface. Extension cracks cannot be avoided altogether, but when they first occur, as they will in cold weather, they should be filled with a heavy composition similar to what is now being used on concrete highways.

Methods to remedy the tendency of concrete floors to crack, dust and disintegrate have been the subject of much study, and a large number of patented methods and devices such as surface hardeners, etc., have been marketed with varying success. It has been found by years of experience, not only in railroad shops, freight terminals, etc., but also in industrial plants of all classifications, that the wearing qualities of a concrete floor depend principally on the coarse aggregate used and on the method of working and mixing the materials. In other words, workmanship counts more than anything else when a good concrete floor is desired, based on specifications adapted to the particular installation with a great exercise of care in the selection of materials during construction. It seems to be generally accepted that an excess of water in mixing, which allows the clay in the cement to rise to the surface, is the principal cause of dusting. Excessive troweling on the finished process is also inadvisable.

When a concrete floor develops holes, repairs may be made in one of two ways. It may be patched by first cutting away and removing all of the loose or poor concrete until the edges and bottom of the hole are of good sound concrete and this hole filled with new concrete. This method, however, usually turns out to be only temporary because it seems almost impossible to get a good bond between the new and the old concrete and another hole will soon develop. The old concrete seems to have absorbed sufficient foreign matter or dirt of a more or less greasy nature to prevent a good bond. The better way is to take out the entire square or slab of concrete and replace with new material.

It is suggested that in the design of large freight houses it might be desirable and practicable definitely to lay out aisles or trucking spaces on which the better and more expensive flooring should be laid, allowing the use of cheaper materials in spaces used for storage and on which very little or no trucking is likely to be done.

J. P. Gallagher (N. Y. C.), D. Rounseville (C. & N. W.), A. T. Hawk (C. R. I. & P.), C. P. Rawson (C. M. & St. P.), T. D McMahon (G. N.), C. J. Scribner (C. B. & Q.), D. L. McKee (P. & L. E.), S. C. Tanner (B. & O.), F. H. Soothill (I. C.), committee.

[The remainder of the proceedings of the convention will appear in next week's issue.]

C. & E. I. Asks Court of Claims to Fix Compensation

WASHINGTON, D. C.

THE Chicago & Eastern Illinois, it has just been learned, some time ago filed in the United States Court of Claims a petition for the purpose of determining the amount of its just compensation for the use of its property by the government during the period of federal control, which the company claims should be $18,801,397 for the entire period of 26 months, or at the rate of $8,677,560 for each year, of which $4,194,000 has been received from the director general at different dates, on account. The claimants therefore claim $14,607,397 subject to the assumption and performance by the United States and the claimants of Sections 5 and 9 of the standard contract in respect to upkeep and return and of accounting.

The petition, which is the first of this character to be filed with the court, was filed by Will H. Lyford as attorney for the company and William J. Jackson as receiver. The petition recites that the Interstate Commerce Commission, pursuant to the federal control act, certified to the President that the average annual railway operating income for the receiver for the three years ended on June 30, 1917, that is, the standard return, was $2,946,000.88. This amount was regarded as inequitable because of the exceptional conditions pertaining to the road, but conferences between the representatives of the road and of the director general failed to accomplish an agreement as to the amount of just compensation. The staff conferences of the director general decided to allow compensation on the basis of the average annual railway operating income during the three years ended June 30, 1913, 1916 and 1917, making $3,360,160. On an appeal by the receiver to the director general this allowance was reduced to $3,271,000.88 and on a rehearing the allowance was finally fixed by the director general as $3,280,000.88. After a hearing Judge Carpenter, in charge of the receivership proceedings, issued a decree declaring this amount inadequate and instructing the receiver to decline it and to proceed to secure the determination of the amount by a board of referees to be appointed by the Interstate Commerce Commission in accordance with the act.

The board of referees on March 18 rendered a report finding that $4,450,000 for each year would be just compensation. Counsel for the director general have notified counsel for the receiver that the director general would not pay the amount awarded by the referees and was unwilling to offer more compensation to the claimants than the amount of his original offer of October 1, 1919, of $3,280,000.88.

The amount of annual compensation which is claimed, $8,677,568, is made up of the following items: $4,408,030, the amount of the net railway operating income for the calendar year 1917; $2,844,730, as the value per year of freight rate increases which were in force, authorized, or in sight on December 31, 1917, and which were not included or reflected in the railway operating income of the receiver for that year; $688,928 as additional hire of equipment not included or reflected in the railway operating income for the calendar year 1917; $594,000 as the cost of reconstructing and repairing during 1917, 1,188 bad order cars which had accumulated during previous years and $141,880, increase in mail pay for 1917.

The Reconstruction of Railway Transportation*

An Analysis of the Reasons for the Transportation Act and Its Promises for the Future

By Alfred P. Thom
General Counsel, Association of Railway Executives

GOVERNMENT by democracy has its tragedies as well as its triumphs. Its triumphs are for the most part in the realm of human liberty. Its tragedies are generally in the field of business and economics.

In popular government the popular will, right or wrong, calm or passionate, must, within the limits of the Constitution, be supreme. It is easy for it to be temporarily mistaken in matters relating to business or property. It is difficult to establish and preserve a just balance of judgment and of political action in dealing with matters of property.

This is especially difficult in respect to the facilities of transportation, which in order to be useful, must, in a sense, be powerful, and must touch the individual in all his social and business activities. Naturally an individual forms his estimate of the motives and of the efficiency of a railroad corporation by what he sees, and what he sees is, for the most part, confined to his own point of contact or to his own business transactions with the company, and cannot, in the nature of things, embrace the entire transportation problem or field of duty and responsibility which the management of the company must consider. He sees the impoliteness and inattention of an individual local employee, or he does not receive prompt payment of a claim which he believes to be just, or he is not furnished a car with the promptness required by the exigencies of his business and believed by him to be possible, or a fire is set by a passing engine, or there is delay in installing an industrial sidetrack.

Under the smart of such occurrences he cannot realize the number of men the management must obtain and train into a proper conception of the rights of the public; the limitation imposed by inadequate financial capacity to create an ideal situation; the demands upon the carrier in other directions, and the consequent necessity on it to balance the demands for the means and facilities at its disposal, so as to produce the best general result, and, where all things cannot be perfect, to promote in the highest possible degree, the general interest and welfare.

In the multitude of a carriers' transactions, there will of necessity be created many critics, and these critics are easily aroused and organized into a hostile attitude to it by any designing political agitator who may see in such dissatisfaction an easy road to the promotion of his own political fortunes and ambitions.

The condition so far referred to is a condition without fault on the side of the honest individual patron or on the side of the carrier which is making an honest effort to do its best. Unfortunately, however, this does not state the whole case.

In the creation and development of these great agencies of transportation, human nature and financial ambition have in the past, as was inevitable, played a large part. At the beginning, the public were dazzled by the advantage promised and the increased opportunities offered by the steam engine and the railroad. In every community there was a demand for railroads. It was only a question of getting them, and there was no thought of limitations or conditions, or of regulation or restriction—only of inducement and encouragement. Investors entered the railroad field and came to look upon the properties which their means and enterprise had created as private property, subject to no limitation or qualification that did not apply to other private property. Some of them accordingly began to use their property to favor those who favored them, to discriminate, whenever they thought it to their advantage, between those needing transportation, to select persons, communities and places which they would build up, to exploit their properties in the financial markets for their private emolument, and to put their interests as speculators and money makers ahead of any social duty.

But when the existence of the facilities was in the public mind assured, the tremendous power over the destinies of men and of localities possessed by those who controlled transportation, became apparent, and the demand became insistent for the eradication of the entire system of favors and discrimination.

This demand, seeking a legal basis, found it in the conception that property devoted to a use in which the entire public has a vital interest and so related to every social and business activity as practically to direct and control them, must not be accorded an unqualified freedom of use, but must be subject to reasonable governmental regulation.

As may be easily imagined, this qualification on the right of private property was fiercely resented by those who had been encouraged to invest. * * * The struggle was long continued and full of bitterness, but ended, as was right, in the acceptance of the view insisted on by those who contended for a power of reasonable regulation by public authority of property devoted to this public use, and so intimately and influentially related to the public welfare.

A Restrictive Policy of Regulation

Unfortunately, however, this victory, won in bitterness and anger, left in the public mind a spirit of resentment and distrust towards the antagonists they had vanquished, and the system of regulation which was adopted reflected this resentment in providing only for restraint, and in omitting entirely the provisions which would have been wise and appropriate for protecting and developing this essential agency of commerce and intercourse. It was assumed that these agencies of transportation were sufficiently powerful to protect themselves and that the public had no interests and no duty except to eradicate evil practices and to restrain evil conduct.

The public was right in its purposes, but, in the hour of its victory and for more than a generation thereafter, it failed to realize the wise limitations it must voluntarily put upon its own power. There was no appreciation of the fact that, under harsh and unsympathetic regulation, conceived and administered only with the purpose of restraint and punishment, the time would ultimately come when men would hesitate to put their means into a business which had been made a pariah by law and public opinion, and thus that the supply of transportation facilities might become endangered and inadequate for the public needs.

On looking back we can plainly see, what a calm forecast would also have revealed, that, if the development of the country and of commerce were to continue, the facilities of transportation must not only keep pace with, but must anti-

*Address before the annual meeting of the Massachusetts Chamber of Commerce, Boston, Mass., October 13, 1920.

cipate this growth, and that the investment of new capital must continually be made; that this investment, under a system of private ownership, must be attracted and could not be coerced, and would not be attracted unless it was protected. But this calm forecast was not made, and, indeed, was not possible, in the then existing state of the public mind.

Deterrents Faced by Investors

For more than a generation the logical resultant of the forces at work has been revealed and the investor has come to realize, when considering investments in railroads, that, if he should invest, he would be embarking his means in a business in which:

1. He could not control his income, for that is regulated for him by public authority;
2. He could not control his expenses, for these were affected by the requirements of many regulating bodies and by the exactions of labor, which, in the case of the railroads, was especially powerful;
3. That the regulation to which he must subject his investment was political in its origin, and thus in danger of being controlled by political rather than by business considerations;
4. That there was not a single co-ordinated and harmonious system or policy of regulation applicable throughout the whole extent of his property, but many regulating authorities—one Federal and many state—with diverse economic and political views and policies;
5. That the policies of regulation were not stable, but largely dependent upon the capacity for agitation of individuals who, at the time and in certain localities, were dominant in public affairs; and
6. That the rewards of success in other industrial enterprises were greater than in this, that the security was no greater here than in other avenues of investment, and that in this industry all hope of speculative reward must be abandoned.

The great transportation giant carried was bound and laid upon the operating table. The diagnosis was that the patient was possessed of a demon which must be exorcised. Those called to perform the operation were not trained experts charged with the duty and responsibility of restoring the patient to health and strength. Instead of a calm and scientific search for the truth, every ambitious experimenter, totally irrespective of his knowledge or his ignorance of economic laws and conditions, of his interested or disinterested attitude to the subject and of his lack of responsibility for the success of transportation, was invited and permitted to participate in the capital operation.

The Transportation of a Nation Threatened

The result was inevitable. Under such an immoderate and ill-considered exercise of public power, new investment in railroads became hesitant, the building of new lines practically ceased, and the efficiency of those already in existence was weakened.

Heretofore railroads have been the pioneers of progress and of the expansion of civilization. Before production must come the facilities of distribution, the means of making useful the fruit of the producer's toil. Until 1913, the transportation capacity of the railroads was in advance of, or had reasonably kept pace with, the increase of production, but since that time the situation has been substantially different.

The country's annual production of steel has increased from 31 million tons to 45 million, and the farms under cultivation from 258 million to 288 million acres. Since 1916 the annual production of bituminous coal has increased from 443 million tons to 580 million; but, turning to the railroads we see that, during the last three years, the number of miles abandoned has been greater than the number of miles constructed. Locomotives and freight cars added during the two years and two months of federal control were barely sufficient to replace the number ordinarily retired in a single year, and complaint was made that there were 150 million bushels of wheat still on the farms or in the country elevators; that live stock had fattened, become over-matured and had declined in value because there was no way to market; that the distribution of coal was inadequate to the extent of threatening national suffering and disaster; that lumber was not moving to market; that mills and other industries were halting in production and were shutting down for want of transportation, and that highway road building had virtually stopped.

This condition of transportation constitutes one of the economic tragedies of history.

The hope of democracy is the fact that the people cannot be mistaken or deceived all the time, and that in heart and purpose they are fundamentally sound. When they realize that they have been acting on false premises and have been misled, they throw aside their false leaders and demand that the mistakes which have been made shall be corrected.

A Change in Public Attitude

No more notable instance can be found of this than the recent change which has taken place in the attitude of the public towards the instrumentalities of transportation.

This change is reflected in the Transportation Act, which became a law on the 28th day of February, 1920.

Only a little while ago, the public regarded every application made by the carriers, for protection and for constructive changes in the system of regulation, as a matter involving only the private fortunes of the owners. The belief had been sedulously cultivated in the public mind that the transportation companies were in fact most prosperous. The warning of the carriers that the adequacy of the instrumentalities of transportation were at stake, was regarded as the insidious effort of private greed, and went unheeded.

The awakening of the country to the truth had to come in the travail and hardship of adversity. The strain of the war came, and productive industry found itself slowed up and hampered by the limited capacity of transportation instrumentalities. The public then began to realize that the maximum productive capacity of a people is measured by the carrying capacity of its instrumentalities of transportation and distribution and that if the comforts of life and the means of living are to be brought within the reach of the masses of the people at reasonable prices and on reasonable terms, there must be strong, efficient and adequate agencies of transportation. This conception of the relationship of transportation to the welfare of the people having been once accepted, and the real fact as to the financial condition of the carriers having come to be understood, many truths heretofore obscured became manifest. The public transferred its interest and anxiety from the question of the cost to the question of the existence of adequate transportation capacity.

It came to appreciate that the producer must face the loss of his product to the extent he could not get it moved to market, and that the banks which had loaned upon it must lose or must carry the loan while the marketing of the product was retarded.

The Transportation Act

As a result of these considerations, the recent legislation by Congress has been enacted into law. In the interest of promptness and certainty it provides a plan for the adjustment with the carriers of matters growing out of federal control; as a means of stabilizing conditions, continues in effect, until thereafter changed by competent authority, the rates, state and interstate, in force at the end of federal control, and, as a measure of support during the period of transition provides a guarantee of a return for six months equal to half the annual compensation paid them respectively by the government for the use of their properties during federal control, and for loans, to a limited amount and at

a reasonable rate of interest, to assist in meeting maturing obligations, which otherwise could not be met, and in adding to the facilities of transportation which otherwise could not be made.

The permanent legislation provides a means of peaceful adjustments of labor controversies; and makes needed amendments of the existing system of regulation; undertakes to provide a system of lawful and supervised consolidation of carrier properties, so that facilities may be improved and competitive conditions measurably equalized to the end that the system of regulatory law may deal more equitably and helpfully with them all; to create a single and exclusive system of supervision and regulation of the issue by carriers engaged in interstate commerce of securities, so that the public interest in the financial condition of these carriers may be properly considered and safeguarded and that the financial proposals of the carriers may be promptly passed on and treated according to a single, harmonious policy, and thus protected from the delays and the diversified policies of many regulating authorities; to vest authority in the Interstate Commerce Commission, in the interest of all the people and of the states themselves, to supervise state rates and practices applicable to interstate carriers, for the purpose of preventing discrimination against interstate commerce and the indirect imposition, through the unwise or niggardly action of a single state, of undue and unequal burdens on interstate commerce and on the people of other states; to establish a system under which the revenues derived from the service of transportation shall be sufficient, under honest, efficient and economical management, and reasonable expenditures for maintenance of way, structures and equipment, to provide a fair return upon the aggregate value, in such groups as the commission may establish, of the railway properties of the carriers held for, and used in, the service of transportation, thus giving assurance to the people of the United States of adequate transportation and means of distribution of the products of their toil; and basically, from the standpoint of credit, to introduce the elements of financial stability and security as a means of making up for the lack of large and speculative rewards.

Inspired by these motives and embodying these constructive principles, the altered system of national regulation has been adopted and put into effect.

It recognizes that transportation is a business in which the public is vitally interested; that the system of private ownership and operation, invigorated and vitalized by individual initiative and enterprise, is in the public interest to be preferred to government ownership and operation, and that it is more equitable to distribute the cost of supporting it among the persons who use it in proportion to their use, than to impose it on all the people by leaving it as a universal tax and paying it out of the public treasury; that the government cannot, in conscience or with due regard for the public welfare, exercise the power of regulation, which involves the restriction of business opportunities, without at the same time accepting the responsibility of seeing that justice is done, proper encouragement and support afforded, and that the charges for transportation, while limited so as to prevent injustice to and extortion on its users, are reasonably sufficient to attract the capital needed to make and keep the facilities of transportation adequate to the public needs. * * *

A New Era

The abandonment of the old and mistaken view that the responsibility of government is fully performed when it punishes misdeeds furnishes new assurance to those who believe in the good sense and the spirit of wisdom and statesmanship which reside in the masses of the people. Men may still debate as to the adequacy of the legislation which has been adopted, but there can be no reasonable difference of opinion as to the soundness or value to the nation of the new conception that has been accepted of the responsibility of government to the subjects which it undertakes to regulate and of the recognition of the fact that the credit of these carriers, on which their ability to perform their essential public service depends, is a matter of public concern.

It remains now to give the new system a fair trial.

The carriers themselves must be keenly alive to their own responsibilities. Trusted to furnish transportation to the people, they must rise to the level of their enlarged opportunities and view their obligations from the standpoint of the public right and public welfare to which they bear so important a relationship. They must see to it that the best quality and the largest quantity of service in their power to give is furnished to the public, and that no narrow or individual view be permitted to control their policies.

The public, on its part, must be patient while this effort is being made. It must realize the difficulties and embarrassments which confront the carriers in resuming the possession of their properties and the performance of their transportation duties. For more than two years they have been out of the possession and control of their properties. During this period the identity of individual properties had been merged into others; the rolling stock—engines as well as cars—had been taken from the system to which it belonged and scattered elsewhere and everywhere as an immediate need appeared to justify until not more than 21 per cent of the cars remained on home lines; repairs on this vagrant and homeless equipment had been inadequate and without uniformity; the working forces had become imbued with the idea that they were working for the government and consequently under a different and reduced system of discipline and responsibility; the management itself had been deprived of the intimate touch with, and knowledge of, their property and its conditions essential to effective and successful administration; and the current revenues from their properties had been taken by the government and no final adjustment or accounting made, leaving their financial situation uncertain.

They came back into their duties and responsibilities of management in the aftermath of the greatest war in history. The earth on which we stand is still trembling from the convulsions which for four years shook it to its foundations and left in devastation and ruin the continent furthest advanced in the arts and in the achievements of civilization. As one of the results of this upheaval there has come throughout the world, including our own land, an increase of class consciousness, class rivalries and class aspirations and demands. Large bodies and groups of men are surging with impatience and resentment against the restraints of society and of law and are fiercely demanding a new and radically altered order in the economy of life.

"The equilibrium between the city and the country in the world's economics has been profoundly disturbed," the number of farm-workers, according to an eminent authority, having in two years decreased 28 per cent. The country boy, whose horizon was formerly limited by the farm on which he worked and the cross-roads store where he spent his rare hours of leisure and recreation, has now seen the wonders, enchantments and opportunities of our great American cities and of London and Paris, and is slow to return to the farm, with all that his failure to return implies in the way of inadequate farm labor, reduced production of agricultural products and higher wages and costs.

In closing, Mr. Thom declared that the carriers, conscientious and energetic, are facing their present and future responsibilities with courage and confidence. They have already made marked progress and they have the co-operation of an able and sympathetic commission inspired by a lofty purpose. If the rates under the new law shall adequately establish the carriers' credit, the plan established by Congress will be a success. But the Interstate Commerce Commission, the state commissions, the labor unions and the carriers must realize, one and all, that they are now on trial.

General News Department

The Interstate Commerce Commission has issued the text of its thirty-second annual report on the Statistics of Railways for the year ended December 31, 1918.

Members of the Chicago Yardmen's Association, who were expelled from the Brotherhood of Railroad Trainmen, following the "outlaw" strikes of last April, filed a suit for $5,000,000 damages against the Brotherhood at Cleveland, Ohio, on October 21. The amount also represents an attempt to recover insurance premiums paid to the B. R. T. by the members of the Yardmen's Association.

The Alabama state fuel administration on October 19 issued an order requiring that all domestic coal mined in Alabama between October 20 and November 6 be shipped to points within Alabama. Retail coal dealers were instructed in the same order not to deliver any coal to any consumer who has a supply of thirty days on hand. The railroads agreed not to confiscate domestic coal, thereby relieving a vexatious problem which has caused serious concern.

The right of a railway to name its own station has been challenged by the Public Service Commission of Missouri. The Chicago, Burlington & Quincy a short time ago had the name of its station at Greencastle, Mo., changed to "Castel." The citizens of the town protested to the Public Service Commission and the result was an order to the company to restore the original name on its time cards not later than November 12.

A train robbery occurred in the city of Buffalo on the morning of October 21, and a trainman was shot. Westbound express train No. 15, of the New York Central, while standing in the Clinton street yard, where additional cars were to be attached to the train, was entered by five robbers; and money and jewelry were taken from passengers in a sleeping car. The time was about two o'clock and nearly all the passengers were asleep. Three suspects have been arrested.

The proceedings of the annual meeting of the Mechanical Section of the American Railroad Association held in Atlantic City, N. J., June 9 to 16, 1920, are now ready for distribution and may be obtained from the secretary, V. R. Hawthorne, Chicago. The Rules of Interchange and Tank Car Specifications, as revised at the annual meeting, have been approved by the executive committee and will be ready for distribution in a short time. The new rules and specifications will become effective November 1, 1920.

Marked improvement has been made in the car situation in the northwest, according to J. T. Danaher, secretary of the Portland committee on car service of the American Railroad Association. A shrinkage in the volume of lumber shipments, coupled with increased efficiency on the part of the railroads, has practically overcome the car shortage. An example of the increased efficiency is shown in the operation of the Portland terminal, in which the average number of cars handled daily for some time past has been 812, whereas recently as many as 3,622 cars were handled in a day.

The announcement by D. B. Hanna, president of the Canadian National, that employees of that system would not be allowed to run for political offices, the penalty being dismissal from the road, aroused a storm of protest at the meeting of Division No. 4, Department of Railway Employees, American Federation of Labor, in convention at Winnipeg, Man., on October 14. The matter was taken up with the Minister of Labor, who informed the employees that it was a ruling made by Mr. Hanna, as president of the Canadian National, and could in no way be interpreted as a ruling of the government. It is the intention of the railroad employees to fight for cancellation of this order.

The Bureau of Explosives, 30 Vesey street, New York City, has issued circular B. C. L. No. 197, addressed to all railroads members of the Bureau, setting forth precautions to be observed in the unloading of tank cars through bottom discharge valves. The Bureau has also issued circular B. C. L. No. 198, containing precautions to be observed in the loading of alfalfa-molasses feeds, and other wet feeds, to prevent heating. The recommendations of this circular embody the result of a conference with feed manufacturers held at Chicago September 15. Such feeds should be loaded so as to permit air circulation between the bags, and there should be 36 inches of space in the upper part of the car. An order has been issued by the Interstate Commerce Commission allowing cars thus loaded to be treated as loaded to their full visible capacity. The Bureau desires to have reports of all fires occurring in the transportation and storage of any articles which may have been set afire by spontaneous chemical changes.

The Empire State Express, of the New York Central, has now been running 29 years; last Tuesday, October 26, having been the anniversary of the first trip. A sketch of the history of the train is given in the New York Central Magazine for October. For many years the train ran through, westbound, New York to Buffalo, 439 miles, in eight hours, with four stops. As patronage increased, necessitating the lengthening of the train to the capacity of the locomotives, the speed was lowered, and the schedule time is now nine hours. In connection with this notice the Magazine denies the rumor, recently printed in various papers, that engine No. 999, which hauled this train on the Mohawk division for a number of years, had been sent to the scrap heap. This engine, William Buchanan's masterpiece, is now numbered 1086, and is still in service, hauling a local passenger train on the Pennsylvania division. It was built in 1893 and cost $13,000. In the last 13 years it has made 13 visits to the shop for general repairs, which repairs cost $14,253.

New York Sectional Committee of the Signal Division

At a meeting held October 21 at the Hotel McAlpin, New York, J. W. Hackett, of the Okonite Company, presented a paper on signal wire. This was accompanied by a motion picture illustrating the complete process of manufacturing signal wire, from the procuring and gathering of the rubber in the regions of the Amazon to the shipping of the finished product. The discussion of this paper developed that to a large extent the faults found in modern insulated wire were due more to the methods used in installing it than to any actual defects in the wire itself. The meeting was well attended, having a total registration of 303 members, representative of most of the eastern roads and wire manufacturers. The next meeting will be held on January 20, 1921, at which L. F. Vieillard, assistant signal engineer of the Long Island, will present a paper on a.c. track circuits.

The Power of Collective Bargaining

The national campaign committee of the sixteen railroad labor organizations has addressed a letter to the members of the organizations, outlining instructions as to how to assist in the defeat for re-election of those members of Congress who voted for the transportation act, which contains the following characterization of the law:

"Adroitly phrased by railroad attorneys to achieve that purpose, the Cummins-Esch law destroys collective bargaining by railroad employees through their various crafts, and renders almost valueless protective agencies built up through years of struggle by employees' organizations. This is accomplished in part by the labor sections of the bill and in part by its guaranty provisions.

"The real power behind collective bargaining is the ability and right, when justice warrants, to cause the employer financial loss. Collective bargaining does not function against a guaranteed employer. No employer need fear financial loss occasioned by strikes or vacations of employees if the government or the people are required by law to make up the loss."

Middle Tennessee Suspends—Car Shortage the Cause

To forfeit its charter and quit the business was the only course left open to the Middle Tennessee. This line, which is 42 miles in length, runs from Mt. Pleasant, Tenn., to Franklin, where it connects with the Nashville Interurban. The failure of the road was laid to its inability to get rolling stock. When the line ceased operation there was freight sufficient to fill some 600 cars waiting at the various stations to be moved. Shippers exerted every effort to have the road continue in operation until this freight was cleared away and the public utilities commission issued an order to this effect. The railroad, however, upon advice from the company's attorney, refused to comply with this order.

Executives to Meet Friday

Such important railroad questions as labor, efficiency programs and coal movement and production probably will receive the attention of member roads in the Association of Railway Executives when they meet in the New Haven boardroom in the Grand Central Terminal Friday afternoon, October 29. The Standing Committee of the association will meet Friday morning and the general conference will occupy the afternoon. While it is not generally expected that the executives will decide at this meeting just what action should be taken regarding the demands of organized railroad labor for national boards of adjustment and other centralized organization, it is expected that those executives who are flatly against nationalization in any form may express their views. At present, however, it appears that this faction is in the minority and the matter will be submitted to further discussion.

Freight Car Economy on Southern Pacific

The Southern Pacific has just issued a report showing the effective manner in which shippers are co-operating in the campaign to increase loading and thus safeguard the car supply. The report says that for the month of August of this year, as compared with August, 1919, over 2,400 more cars were made available by improved efficiency on the part of the public. The report calls attention to the Good Railway Service Association, which is made up of shippers and public-spirited citizens in almost every community in California, to whom much of the credit for the campaign's success is given. The report shows that shippers of the following commodities saved cars as indicated:

Barley	149	Salt	61
Brick	34	Stock	24
Cement	131	Stone and sand	64
Corn and cats	15	Sugar	147
Cotton	1	Corrugated pipe and tile	58
Cotton seed	1	Wheat	68
Lumber	815	Wine	10
Mill stuffs	59	Wood	76
Oil in tank cars	144	Miscellaneous	492
Perishable	53		
		Total	2,402

Conference on Employment

Present indications point to a large attendance of employment managers, representatives of employment bureaus and educators at the conference on employment and vocational education which will be held at the Congress Hotel, Chicago, on Friday, November 12. This conference, which is sponsored by the American Association of Engineers, will consider the problems of employment which are confronted by non-commercial employment bureaus, and will discuss the relation between employment service and education. A. B. Crawford, director of the bureau of appointments of Yale University, will discuss the placing of the graduate in his first position. Frank D. Chase, president of the Frank D. Chase, Inc., Chicago, will speak on the attitude of the employer toward the man placed in his employ by the employment bureau. Employment office administration will be discussed by George P. Hambrecht, chairman of the Industrial Commission of Wisconsin. The relation between education and industry will be presented by John B. Densmore, director-general of the United States Employment Service.

New York Section of the A. S. C. E.

A start was made at the October 20 meeting of the New York Section of the American Society of Civil Engineers towards a series of discussions which it is hoped will lead to some plan to point the way toward a better development of the metropolitan district of New York. The subject as introduced by Charles D. Hine was concerned with the local distribution of freight and food products. This was supplemented and added to by talks by such engineers as F. A. Molitor, B. F. Fitch, J. S. Eaton, Fred Lavis and others. The subject was handled in a broad general way and while various suggestions and plans were offered they were more general than specific, being presented primarily as a basis upon which future plans could be built.

Bankers' Views on Railroads

The following resolution relating to transportation was adopted by the American Bankers' Association at its convention in Washington on October 22:

"Legislation now on the statute books has been enacted with the object not only of replacing the transportation facilities of the country in the hands of their owners on an equitable basis, but also of establishing the credit of the carriers so that they may be enabled to render the fullest possible public service. In effect, national guaranties have been given in this matter. By intelligent and broad-visioned administration of the Esch-Cummins law, with all practicable co-operation on the part of the carriers themselves in working out a new era of transportation usefulness, the interests of the country as a whole should be materially advanced. In this it is essential both that recognized investments be conserved and that the way be kept open so that necessary funds may be available for equipment and extension of railway facilities. We urgently request the Interstate Commerce Commission and the railroad officials of the country to continue to render the utmost assistance toward providing efficient and regular transportation of products to market. It is our firm opinion that the present law should be altered so that bankers and business men, regardless of their dealings with railroads, can serve on railroad directorates, being charged with full responsibility in connection with their duties in that capacity.

National Association of Railroad Commissioners

The National Association of Railway and Utilities Commissioners will hold its 32nd annual convention at Washington, D. C., for four days, beginning on Tuesday, November 9, as announced in the *Railway Age* of September 10, page 459. At the first session, on Tuesday morning, at 10 o'clock, Chairman E. E. Clark, of the Interstate Commerce Commission, will deliver an address of welcome; and he will be followed by Walter A. Shaw, of Illinois, president of the association. On Tuesday afternoon there will be an address by Hon. George W. Anderson, former member of the Interstate Commerce Commission and now United States judge in Massachusetts. On Wednesday morning Hon. Clyde B. Aitchison, Interstate Commerce Commissioner, will speak on "The Car Situation." There will be a report on bases of valuation, followed by the election of officers of the association for the ensuing year. On Wednesday afternoon and Thursday afternoon there will be informal discussions on (a) problems of street and interurban transportation; (b) the gas problem; (c) enforcement of service standards, and (d) public relations.

The time not required for what is outlined in the foregoing paragraph will be devoted to the presentation and discussion of committee reports. There are 17 standing committees, but no copies of reports have as yet been given out. The committees, with the names of their chairmen, are as follows: Executive, D. N. Lewis, Iowa; Public Ownership and Operation, P. J. Lucey, Illinois; Safety of Railroad Operation, C. C. McChord, I. C. C.; Safety of Operation of Public Utility Companies, J. W. McCardle, Indiana; Railroad Service, Accommodations and Claims, B. M. Clen Dening, Ohio; Service of Public Utility Companies, C. F. Dupuis, North Dakota; Railroad Rates, J. F. Shaughnessy, Nevada; Public Utility Rates, John S. Allen, Wisconsin; Car Service and Demurrage, E. V. Kuykendall, Washington; Express Carriers, George P. Pell, North Carolina; Statistics and Accounts of Railroads, W. D. B. Ainey, Pennsylvania; Statistics and Accounts of Public Utility Companies, O. O. Calderhead, Washington; Grade Crossings and Trespassing

on Railroads, William M. Smith, Michigan; Valuation, H. G. Taylor, Nebraska; Capitalization and Intercorporate Relations, E. O. Edgerton, California; State and Federal Legislation, C. D. Jackson, Wisconsin; Publication of Commissions' Decisions, J. B. Walker, New York.

The secretary of the association is James B. Walker, 49 Lafayette street, New York City.

The Bridge and Building Supply Men's Association

The exhibit of the Bridge and Building Supply Men's Association presented at Atlanta, Ga., in connection with the American Railway Bridge and Building Association, was the largest as regards the number of exhibitors in the history of the organization. The exhibits of the 38 member companies consisted chiefly of literature and photographs, although in some instances models and samples of various types of equipment were shown.

The officers of the association for the past year were: President, Tom Lehon, the Lehon Company, Chicago; vice-president, C. E. Ward, U. S. Wind Engine & Pump Company, Batavia, Ill.; treasurer, M. J. Trees, Chicago Bridge & Iron Works, Chicago; secretary, G. R. McVay, The Barrett Company, Chicago; honorary director, P. C. Jacobs, H. W. Johns-Manville Company, Chicago. The members of the executive committee were: E. T. Howson, *Railway Age*, Chicago; C. W. Lindholm, Patterson-Sargent Company, Cleveland, Ohio; W. O. Washburn, American Hoist & Derrick Company, St. Paul, Minn.; A. J. Filkins, Paul Dickinson Company, Chicago; D. J. Higgins, American Valve & Meter Company, Chicago, and F. M. Condit, Fairbanks, Morse & Co., Chicago.

At the annual election on Thursday morning the following officers were selected: President, C. E. Ward, U. S. Wind Engine & Pump Company, Batavia, Ill.; vice-president, Merle J. Trees, Chicago Bridge & Iron Works, Chicago; treasurer, C. R. McVay, Barrett Company, Chicago; secretary, A. J. Filkins, Paul Dickinson Company, Chicago; honorary director, Tom Lehon, the Lehon Company, Chicago; members executive committee, W. O. Washburn, American Hoist & Derrick Company, St. Paul, Minn.; C. W. Kelly, the Kelly Derby Company, Chicago; D. J. Higgins, American Valve & Meter Company, Chicago; F. M. Condit, Fairbanks, Morse & Co., Chicago; T. W. Snow, the T. W. Snow Construction Company, Chicago, and W. H. Lawrence, the H. W. Johns-Manville Company, New York City.

The companies exhibiting, with the nature of their displays and the names of their representatives, were as follows:

American Hoist & Derrick Company, St. Paul, Minn.; literature; W. O. Washburn, F. J. Johnson, J. L. Prator and R. R. Nixon.

American Tar Products Company, Chicago; P. J. Griffiths and S. H. Fields.

American Valve & Motor Company, Cincinnati, Ohio; models of non-freezable drop spouts and water columns; J. T. McGarry and D. J. Higgins.

Asphalt Block Pavement Company, Toledo, Ohio; samples of asphalt paving; E. J. Snyder.

Barrett Company, New York; samples of shingles and roofing, literature; G. R. McVay and W. E. May.

Buda Company, Chicago; P. W. Wood.

Carter Bloxonend Flooring Company, Chicago; samples of paving blocks and photographs; R. G. Stowell.

Chicago Bridge & Iron Works, Chicago; literature; M. J. Trees and J. L. Zeller.

Detroit Graphite Company, Chicago; samples of white enamels; literature; L. D. Mitchell, A. B. Edge, W. D. Waugh, J. R. C. Hintz and J. F. Neiman.

Paul Dickinson Company, Chicago; ventilators; Arthur J. Filkins and D. B. Wright.

Dixon, Joseph, Crucible Company, Jersey City, N. J.; model of painted station; H. A. Nealley and J. H. Lewis.

Duff Manufacturing Company, Pittsburgh, Pa.; jacks; G. E. Watts and W. T. Willingham.

Fairbanks, Morse & Co., Chicago; literature; A. A. Taylor, F. M. Condit, H. E. Vogel, M. J. Kockendorfer, F. L. Daggett, B. S. Spaulding, C. T. Fugitt, J. M. Barron, J. T. Frame and D. K. Lee.

High Grade Manufacturing Company, Cleveland, Ohio; Gilso cement; S. A. Baber.

Johns-Manville Company, H. W., Chicago; asbestos roofing and pipe covering; W. H. Lawrence and H. J. Newman.

Kaustine Company, Buffalo, N. Y.; literature; D. A. Evans and J. H. Fotheringham.

Kelly-Derby Company, Chicago; C. F. Smale.

Lehon Company, The, Chicago; roofing and shingles; Tom Lehon and J. E. Eipper.

Massey Concrete Products Company, Chicago; literature; J. A. Higgs, Jr.

M. & G. Company, The, Chicago; yard and stock-pen hydrants; L. W. Millar.

National Water Main Cleaning Company, New York; Burt B. Hodgman.

Nelson (Jos. E.) & Sons, Chicago; photographs and literature; J. E. Nelson and W. H. Nelson.

Nichols (Geo. P.), & Brothers, Chicago; literature; George P. Nichols and S. E. Nichols.

Norton, A. O., Inc., Boston, Mass.; self-lowering jacks; G. R. Law and W. R. Kelly.

Patterson & Sargent Co., Cleveland, Ohio; W. W. Huntley.

Raymond Concrete Pile Company, New York; shell for concrete piles; H. D. Oliver.

Simmons-Boardman Publishing Company, New York; copies of *Railway Age* and Railway Maintenance Engineer; E. T. Howson, Milburn Moore and B. J. Wilson.

Railway Review, Chicago; W. M. Camp.

Robertson & Co., Wm., Chicago; model of culvert and photographs; R. F. Repasz.

Sherwin Williams Company, Cleveland, Ohio; M. E. Williams.

Snow Construction Company, T. W., Chicago; literature; T. W. Snow.

Standard Asphalt & Refining Company, Chicago; samples of waterproofing materials, etc.; G. A. Thornton.

Texas Company, The, New York; roofing and roof paint; J. F. Ryan and F. K. Dorrance.

U. S. Wind Engine & Pump Company, Batavia, Ill.; literature; C. E. Ward.

Virginia Bridge & Iron Company, Roanoke, Va.; J. W. Leroux.

Volkhardt Company, Inc., Stapleton, N. Y.; W. Volkhardt.

Vulcanite Company, The, Chicago.

White (L. & I. J.) Company, Buffalo, N. Y.; adzes; C. H. Broward and C. S. Broward.

Railroad Guaranty Payments Still Held Up

Secretary of the Treasury Houston has told newspaper men that the decision of the comptroller of the treasury that the treasury must not honor certificates of the Interstate Commerce Commission for partial payments to the railroads on account of their six-months' guaranty, except where the applications were filed before September 1, but that the payment of the balance of the amounts due must await a complete determination by the commission of the amount, is final, and that the treasury does not expect any ruling from the attorney general which will lead to any reversal or reconsideration of the decision. The secretary took the position that the attorney general has no jurisdiction in the matter, although representatives of the railroads and of the Interstate Commerce Commission are undersood to hold the belief that precedents are available on which the comptroller could be overruled. Mr. Houston also took the position that if the railroads need their money they should "get busy" and increase their accounting forces for the purpose of figuring the final amounts due, now estimated at about $400,000,000, as about $234,000,000 has been paid on certificates of the commission for advances as authorized by the law up to September 1.

No information has yet been made public as to the position of the Department of Justice in the matter.

The Interstate Commerce Commission has issued a questionnaire on which railroads that accepted the guaranty provisions of the transportation act are required to give, on or before January 1, 1921, the complete information desired by the commission for the purpose of making settlements with the carriers as to the amounts necessary to make good the guaranty provided for in Section 209 of the act, which the commission is required to certify to the Treasury. Under the law the commission is also to determine the amount which may be charged to maintenance for the guaranty period for the purposes of fixing the amount of the guaranty. In the questionnaire it is stated that consideration has been given to the matter of formulas to be applied in making adjustment of maintenance expenses, but no such formulas have yet been adopted by the commission. Each respondent carrier may, therefore, prepare and submit for the consideration of the commission such data with respect to the adjustments which it may propose in connection with maintenance expenses as it deems proper under the provisions of the law applicable thereto. The principal factors which the commission will consider in fixing the amounts to be included in operating expenses for the guaranty period for maintenance of way and structures and for maintenance of equipment are:

(a) The differences in the cost of labor and material.

(b) The difference in the amount of property used; and

(c) The difference in the use of the property during the guaranty period as compared with the test period. The respondent carrier should be governed accordingly in preparing data in support of any adjustments proposed.

Traffic News

The Pennsylvania will open a commercial office in Dallas, Tex., on November 1 to be in charge of L. J. Warner, district freight representative, and L. G. Russell, district passenger representative.

The Traffic Bureau of Muncie, Ind., has been organized with W. C. Pike, formerly in the traffic department of the Maxwell Motor Company, Newcastle, Ind., as manager. The bureau is supported by the Chamber of Commerce and industrial and commercial interests of Muncie.

The Transportation Club of Decatur, Ill., held its annual "railroad night" on Wednesday evening, October 27, with a banquet at the Orlando Hotel of that city. Following the dinner, J. F. Holden, vice-president of the Kansas City Southern, addressed the meeting. A. B. Aiken, general agent, Chicago, Rock Island & Pacific at St. Louis, Mo., acted as toastmaster.

The Lumber Reshipping Yards Traffic Association has been organized at St. Louis, Mo., by traffic representatives of lumber companies having lumber yards in St. Louis and doing a reshipping business from these yards. The object of this association is to bring together the traffic representatives in order that by united action they can handle traffic matters to the mutual interest of themselves and the carriers. T. H. Lynch, traffic manager of the Philip Gruner & Bros. Lumber Company, is president; and Earl Kauffman, traffic manager of the Thomas & Proetz Lumber Company, is secretary and treasurer. Offices have been located at 3400 North Hall street, St. Louis, Mo.

Railway Courses in California University

Walker L. Trammell of the traffic department of the Southern Pacific is organizing a class in the study of railroad transportation and traffic management. Classes are to be held over a period of 40 weeks, meeting on Monday and Thursday evenings of each week and registrations are now being received at the San Francisco (Cal.) office of the university extension of the University of California. The course will comprise the study of railroad rates and rate making, shipping regulations, tariffs, routes and routings. Interstate Commerce Commission rulings and other phases of shipping. The extension division of the University of California is to maintain in the Monadnock building in San Francisco a freight traffic library for students and shippers who desire to increase their knowledge.

New York Traffic Club

The New York Traffic Club held its October meeting at the Waldorf-Astoria Hotel on the evening of the 26th. The principal speaker was George H. Ingalls, vice-president, New York Central Lines, whose subject was "The Problem of Increasing the Efficiency of Transportation." "It is not wholly the railroads' problem," said Mr. Ingalls, "any more than is the general responsibility of the American citizen to take sufficient interest in the necessities of such a fundamental industry as transportation as to exert his influence toward seeing that it receives fair consideration, treatment and co-operation. That the railroads emerged from the war period woefully short of good order locomotives is a fact, not a theory. In the absence of ample motive power the 'speeding up' of freight cars is to be accomplished largely through cutting down the delays in terminals. Ability to speed up is dependent upon the spirit or morale of the working forces, in railroading just as in everything else. If the shipper cannot induce his forces to load and unload freight cars with reasonable celerity, it should not be surprising if the railroads have difficulty in getting their switchmen, trainmen and freight handlers to break records. * * * There has been a distinct improvement in the morale of railroad service." The annual meeting of the club will be held on November 23, when the election of officers will take place. The nominee for president is R. J. Menzies, International Nickel Company.

Commission and Court News

Interstate Commerce Commission

The commission has suspended until November 16 the proposed cancellation of rates on soap from Meridian, Miss., and Bristol, Tenn., to stations on the Gulf, Mobile & Northern, leaving combination rates applicable.

The Commission has suspended until February 22 the operation of certain tariffs which propose to cancel the existing rating of one-half of fourth class, any quantity, and specific commodity rates on empty beer packages, etc., between points in western trunk line territory, leaving fourth class rates, l.c.l., and class D rates, c.l., applicable instead.

The commission has suspended to March 1, 1921, the operation of tariffs which provide fares from St. Louis, Mo., Peoria and other important Illinois points to Arizona and California destinations, via New Orleans, La., to make them in accord with short line fares from Chicago, Ill., to the same destinations via New Orleans which were suspended by the original order of September 30.

The commission has suspended until February 20 the operation of certain schedules which provide for the cancellation of the proportional class arbitraries, and through rates constructed by such arbitraries, from Norfolk, Va., to United States Naval Operating Base, Hampton Roads, Sewalls Point, Va., applicable on l. c. l. traffic from eastern territory, leaving local or combination rates applicable instead.

The Interstate Commerce Commission has announced a proceeding of investigation on the refusal of the Public Service Commission of Indiana to put into effect for intrastate traffic the full amount of the rate increase authorized by the Interstate Commerce Commission in the general rate advance case, and it has assigned the case for hearing before Attorney Examiner Disque on November 11 at Indianapolis. A similar proceeding has been ordered in the Louisiana case and a hearing has been assigned before Examiner Brown on November 22 at Baton Rouge.

State Commissions

The Illinois Public Utilities Commission has announced that the freight rate increases granted by that body are to become effective on November 1.

The Railroad Commission of California on October 11 granted the request of the South San Francisco Chamber of Commerce to place that city on an exact parity in connection with main line haul traffic, as exists at Oakland. This extends the San Francisco switching limits to take in the South City. The order of the commission also directs the removal of the discrimination in favor of the east bay section as against South San Francisco, as a result of the carriers' 30-cent switching zone in Oakland, which extends from Oakland Wharf to Elmhurst.

The Railroad Commission of the State of California in a letter to the governor of the state transmitting its annual report states that it reserves the right of adjustment in all railway matters. The letter says that: "It is a mistake to conclude that the commission is relieved from all work in connection with the steam railroads. Jurisdiction over service and safety, and especially over all grade crossing matters, is still undoubtedly vested in this commission. In the matter of rates, the commission, while adopting the general rate increases promulgated by the Interstate Commerce Commission, has reserved to itself the right of making such adjustments in this state as may seem necessary and fair in the particular circumstances surrounding the existing conditions." A similar statement of the committee's attitude toward the Transportation Act and the power of the Interstate Commerce Commission was included recently in a letter to the Interstate Commerce Commission.

Equipment and Supplies

Car Production—Nine Months' Figures

The production of freight and passenger cars for domestic service in September showed an increase over August. The passenger car deliveries were within one car of being as large as those for any two preceding months. The freight car deliveries were the largest for any month since February, although they were still on the low scale that has characterized this year's production to date. The figures, as reported to the Railway Car Manufacturers' Association by the 21 members of that organization and the two non-members co-operating with it in this matter, show deliveries in September of 3,529 freight and 38 passenger cars for domestic service; 1,088 freight cars for export, and freight car repairs amounting to 3,140. The figures for the month and the cumulative figures for the year are shown in the table below. The names of the car-building firms supplying the figures were given in the *Railway Age* of September 24, page 511.

The figures follow:

TABLE I—CARS DELIVERED

	Freight cars		Passenger cars	
	Domestic	Foreign	Domestic	Foreign
January	4,482	1,904	1	9
February	3,774	1,039	4	..
March	2,796	1,994	11	28
April	2,127	1,912	15	..
May	2,630	1,387	..	..
June	2,608	708	..	21
July	2,583	380	18	27
August	3,056	1,184	21	13
September	3,529	1,088	38	..
	27,585	11,596	108	98

TABLE II—CARS ON ORDER AND UNDELIVERED

(Figures for End of Month)

	Freight cars			Passenger cars		
	Dom.	For.	Total	Dom.	For.	Total
December, 1919	24,816	10,720	35,536	407	110	517
January, 1920	27,282	9,381	36,663	311	103	414
February, 1920	29,706	8,389	38,095	282	103	385
March, 1920	33,061	7,854	41,455	522	80	602
April, 1920	42,869	7,180	50,049	586	88	674
May, 1920	47,761	6,338	54,099	732	110	842
June, 1920	48,171	7,792	55,963	796	97	893
July, 1920	50,275	8,212	58,487	811	88	899
August, 1920	49,442	7,574	57,016	861	75	936
September, 1920	48,114	6,793	54,907	903	75	978

TABLE III—FREIGHT CAR REPAIRS

	Delivered during month	Delivered Jan. 1, to end of month	On order and undelivered at end of month
May	2,296	10,442	20,130
June	2,541	12,983	24,092
July	2,491	15,474	23,541
August	2,818	19,269	27,031
September	3,140	21,260	26,710

Locomotives

THE CHESAPEAKE & OHIO is inquiring for 5 Pacific type locomotives.

THE CHICAGO, TERRE HAUTE & SOUTHEASTERN is inquiring for some 0-8-0 type locomotives.

THE DELAWARE & HUDSON has ordered one locomotive from the American Locomotive Comuany.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered 6 locomotives from the American Locomotive Company.

THE RAPIER EXPORT COMPANY, 30 Church street, New York, is in the market for 2 locomotives, new or second-hand, of from 15 to 20 tons weight, capable of hauling 80 to 100 tons over grades of 2½ per cent, for shipment to Mexico.

THE WINSTON-DEAR COMPANY, Hibbing, Minn., has ordered, from the American Locomotive Company, two six-wheel switching locomotives. These locomotives will have 21 in. by 26 in. cylinders and a total weight in working order of 160,000 lb.

Freight Cars

THE NEW YORK, CHICAGO & ST. LOUIS is asking for prices on 500 stock cars.

THE STANDARD OIL COMPANY OF INDIANA is inquiring for 20 steel gondola cars of 50 tons capacity.

SPANISH RAILROADS are asking car builders for prices on 20 refrigerator cars of 30 tons capacity.

THE PENNSYLVANIA RAILROAD is asking prices on 1,000 refrigerator cars and 1,500 box cars, all of 50 tons capacity.

THE DELAWARE, LACKAWANNA & WESTERN is having repairs made to 1,000 box cars at the Berwick shops of the American Car & Foundry Company.

THE NORFOLK & WESTERN is asking prices on specialties for 1,000, 120-ton hopper cars to have six-wheel trucks. The company may build these cars in its shops at Roanoke, Va.

THE UNITED FRUIT COMPANY, Pier 9, North River, New York, reported in the *Railway Age* of October 8, as inquiring for 100 flat cars, has ordered this equipment from the Magor Car Company.

THE CENTRAL OF GEORGIA, reported in the *Railway Age* of September 24 (page 547) as inquiring for 500 40-ton ventilated box cars, 200 50-ton flat bottom cars and 100 40-ton stock cars, has withdrawn these inquiries indefinitely.

THE CAROLINA, CLINCHFIELD & OHIO, reported in the *Railway Age* of October 15, as inquiring for 100, 40-ft. flat cars of 50 tons' capacity, is not in the market for this equipment. The inquiry for these cars was for an industrial located on its lines.

THE ACAR MANUFACTURING CORPORATION, 30 Church street, New York, recently ordered 50 8,000-gal. tank cars from the Pennsylvania Tank Car Company, also 35 10,000-gal. and 65 8,000-gal. tank cars from the American Car & Foundry Company. Deliveries are now being made on these cars.

Passenger Cars

THE PITTSBURGH RAILWAY, Pittsburgh, Pa., are inquiring for 25 sets of motor trucks.

THE CHICAGO & NORTH WESTERN has ordered nine smoking cars from the American Car & Foundry Company.

Iron and Steel

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 30,000 tons of rails from the United States Steel Corporation.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 40,000 tons of rails from the United States Steel Corporation.

THE CHICAGO & NORTH WESTERN has ordered miscellaneous material amounting to 114 tons for an ore dock work at Ashland, Wis.

THE CHICAGO, BURLINGTON & QUINCY has ordered girders for a bridge at Rock Falls, Ill., amounting to 124 tons from the American Bridge Company.

THE CHICAGO & ALTON has ordered 121 tons of steel from the American Bridge Company to complete two additional stories in its new north freight and office building at Chicago.

MEXICAN OIL INDUSTRY.—According to an official report on the oil industry of Mexico, there are at the present time over 770 miles of pipe line in use. These lines have a daily capacity for transporting 382,016 cubic metres of oil, or more than two million of barrels. There are now in the petroleum zones a total of 1,103 wells, of which the number in production is 305. In this connection Mexico has the largest well in the world, the Cerro Azul No. 7, which produces 370,000 barrels daily. There exist about 900 tanks used for the storage of the petroleum destined for immediate exportation.

Supply Trade News

F. M. Whyte, vice-president, with office at New York, of the **Hutchins Car Roofing Company,** Detroit, Mich., has resigned, effective November 1.

The Colburn Machine Tool Company has removed its entire business from Franklin, Pa., to its new plant at 1038 Ivanhoe road, Cleveland, Ohio.

Clarence C. Brinley has been appointed eastern manager of the trolley carrier department of the **Conveyors' Corporation of America,** Chicago. Mr. Brinley's headquarters are at 110 West Fortieth street, New York.

D. J. Crowley has been appointed Michigan sales agent of the **Tacony Steel Company,** Philadelphia, Pa. Mr. Crowley's office is in the Dime Bank Building, Detroit, Mich. **D. B. Carson** has been appointed Cleveland district sales manager.

G. E. Anderson, formerly assistant eastern sales manager of the **Duff Manufacturing Company,** Pittsburgh, Pa., has been promoted to southwestern sales manager in charge of its new branch office in the Railway Exchange building, St. Louis, Mo.

C. C. Fredericks, whose appointment as general manager of the **St. Louis Pump & Equipment Company,** St. Louis, Mo., was announced in the *Railway Age* of October 22 (page 725), was born on August 18, 1882, at Richmond, Va. Mr. Fredericks was educated at Valparaiso University, Valparaiso, Ind. Practically his entire business experience has been with oil and liquid handling equipment. He entered the employ of S. F. Bowser & Co., Ft. Wayne, Ind., in 1912, and served this company in various capacities from salesman to executive assistant. For the four years preceding April, 1920, he had charge of the railway business of S. F. Bowser & Co.

C. C. Fredericks

Joseph Markham, formerly railway sales representative of the E. I. Dupont de Nemours & Co., Inc., has been appointed sales agent of the Pressed Steel Car Company and the Western Steel Car & Foundry Company, with office in the Peoples Gas building, Chicago.

Obituary

Elisha S. Williams, vice-president of the **United States Rubber Company,** 1790 Broadway, New York, died on October 8. He was born in 1873 at Malden, Mass., and after leaving school entered the employ of the Revere Rubber Company. He later became president of this company, and in January, 1910, when the Revere Rubber Company was bought by the United States Rubber Company, Mr. Williams was elected president of the Rubber Goods Manufacturing Company, which at that time, through its subsidiaries, controlled all the mechanical and tire business of the United States Rubber System. In 1915, Mr. Williams was elected vice-president of the United States Rubber Company, in charge of the mechanical goods business. He was also a director of the company, a member of the operating council, and president of several subsidiary companies.

Railway Construction

CANADIAN PACIFIC.—This company is constructing the following branch lines: From Rosetown, Sask., southwest a distance of 45 miles; from Milden, Sask., southwest a distance of 59 miles; from Wymark, Sask., to Archive, a distance of 25 miles; a line 60 miles long extending east from Consul, Sask.; and a section of line extending 18 miles west from Altawan, Sask. The company also expects to begin construction this fall on a line extending a distance of 50 miles northeast from Lanigan, Sask.; a 12-mile line extending north from Russell, Man.; 25 miles of line south from Leider, Sask.; and a line from Acme, Alta., to Empress, Alta., a distance of 25 miles.

CHICAGO, INDIANAPOLIS AND LOUISVILLE.—This company contemplates the construction of car repair shops at Lafayette, Ind.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—This company is accepting bids for the construction of a car repair shop at Bloomington, Ind., to cost approximately $35,000.

CHICAGO & NORTH WESTERN.—This company has awarded a contract to John Marsh, Chicago, for the construction of an extension to its Heineman branch line 2½ miles in length, tapping a lumber region near Antigo, Wis. The work will cost approximately $75,000.

CORNWALL.—This company has awarded a contract to the Austin Company, Cleveland, Ohio, for the construction of a machine and locomotive erecting shop at Lebanon, Pa. The new building will be of reinforced concrete, brick and steel construction. The dimensions will be 140 ft. by 180 ft. and 50 ft. high. The cost is estimated at approximately $160,000.

FT. DODGE, DES MOINES & SOUTHERN.—This company has awarded contracts to W. J. Bitterell, Webster City, Iowa, and the American Bridge Company for work in connection with the rebuilding of the frame trestle approach to a bridge crossing the Des Moines river, near Ft. Dodge, Iowa.

KANSAS CITY, MEXICO & ORIENT.—This company contemplates the extension of its line from San Angelo, Tex., to Del Rio. The construction will be financed by the company, independent of loans from the government.

MICHIGAN CENTRAL.—This company is constructing a frame passenger station at Cheboygan, Mich., to replace the station destroyed by fire last year. The company is also installing a transfer table at its shop at Jackson Junction, Mich., at a cost of approximately $30,000, and is rebuilding a coaling station at Jackson Junction which was recently destroyed by fire.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—This company has awarded a contract to the Consolidated Construction & Manufacturing Company, Withee, Wis., for the construction of a passenger and freight station at Phillips, Wis. The building will be a single story structure, 24 ft. by 150 ft., of reinforced concrete, brick and tile, and will cost approximately $35,000.

NEW YORK CENTRAL.—This company is accepting bids for the construction of a subway under its tracks at Brown street, Rochester, N. Y., to cost approximately $500,000. The company has recently awarded a contract to the Peckham Construction Company, Buffalo, N. Y., for the railway's share in the construction of a viaduct over its tracks at Herkimer, N. Y., which will cost the company approximately $46,000.

OCEAN SHORE.—The Railroad Commission of California has authorized this company to discontinue service permanently on its northern division, extending from San Francisco, Cal., to Tunitas, and to dismantle and dispose of this property. The application of the road for permission to discontinue service on its southern division will be taken up by the commission at a later hearing. Construction of the Ocean Shore was begun in 1905, and in 1911 the original company, the Ocean Shore Railway, was acquired through a foreclosure sale by the Ocean Shore Railroad Company.

The road is approximately 54 miles in length, and has been operated at a loss, continuously since 1912, occasioning the assessment of its stockholders on seven occasions at the rate of $29 a share, raising in all $1,107,164, a sum, however, which proved insufficient to meet the needs of the road.

PACIFIC GREAT EASTERN.—This company has awarded a contract to the Northern Construction Company, Vancouver, B. C., for the construction of a line from Deep Creek, B. C., to Prince George, a distance of 136 miles. The project, which will cost $10,000,000, involves the construction of 36 timber trestles and one viaduct 600 ft. in length. The company has recently placed a line in operation from Squamish, B. C., to Deep Creek, a distance of 294 miles.

PENNSYLVANIA RAILROAD.—The Interstate Commerce Commission has approved a loan to this company of $6,780,000 from the revolving fund for additions and betterments. The company's application shows the following as the principal items of the proposed expenditure:

New pier grain elevator, Baltimore	$740,000
New additional enginehouse facilities at Wilmington	500,000
New first and fourth tracks, Maryland division	632,000
Grade revision Oakville to Shippensburg	123,600
Raising bridge at Pittsburgh	187,802
Enginehouse facilities at Canton	699,790
Yard facilities at Canton	108,784
Third and fourth tracks at Canton	128,000
Third and fourth tracks Maximo to Canton	238,337
Polk street and Taylor street viaduct, Chicago	150,000
One Hundred and Twelfth street viaduct, Chicago	208,500
Fort Wayne shop improvements	350,000
Chicago Junction yard and enginehouse facilities	810,896
Wellsville shop improvements	122,112
Cleveland track elevation work	130,000
Grade revision Kenwood to Rochester	400,000

RICHMOND, FREDERICKSBURG & POTOMAC.—This company has awarded a contract for the construction of a freight warehouse at Richmond, Va., to the J. T. Wilson Co., of Richmond. The new building will be 71 ft. by 253 ft. with a concrete foundation, brick walls and a steel truss roof and will cost approximately $100,000.

ST. LOUIS-SAN FRANCISCO.—This company has awarded a contract to the William McDonald Construction Company, St. Louis, Mo., for the construction of a roundhouse and machine shop at Dublin, Tex. The Frisco has also awarded contracts to the Hedges-Weeks Construction Company, Springfield, Mo., for the setting of a new turntable, and the construction of cinder conveyors and materials racks at Dublin.

TEXAS, OKLAHOMA & EASTERN.—This company is constructing a line from Broken Bow, Okla., to De Queen, Ark., a distance of 25 miles, at a cost of approximately $600,000, which will permit the company to operate its line from Valliant, Okla., to Dierks, Ark., a distance of 76 miles, by January 15, 1921.

THE CANADIAN NATIONAL.—This company is constructing a station at Marchand, Man., to replace a structure destroyed by fire.

UNION PACIFIC.—This company is constructing 1½ miles of additional yard tracks in connection with the extension of its terminal facilities at Shoshone, Idaho.

WESTERN PACIFIC.—This company has awarded a contract to Twohey Brothers, San Francisco, Cal., for the construction of a line from Bidwell, 1½ miles, to Bidwell Bar, Cal. The building of the line will involve the excavation of 32,000 cu. yd. of solid rock.

COAL OUTPUT PER MINER.—The average production for each underground worker employed in the coal mines of the United States during 1918 were 1,134 short tons, according to statistics published by the United States Bureau of Mines. The closest competitor as regards output per miner is New South Wales, where each underground worker in 1918 produced 814 tons. British Columbia ranked third, with 790 tons, and Nova Scotia was fourth, with 718 tons. The smallest individual output for recent years was that of Japan in 1917, when an average of 155 tons was mined by the underground employees.

Railway Financial News

ALABAMA GREAT SOUTHERN.—Robert Mallory, Jr., of Spencer Trask & Co., has been elected a director.

AKRON, CANTON & YOUNGSTOWN.—This company's application to the Interstate Commerce Commission for authority to resell or pledge as collateral for short term loans $382,700 of first mortgage, 6 per cent gold bonds, has been assigned for a hearing at Washington on October 28.

ATCHISON, TOPEKA & SANTA FE.—This company has been authorized by the Interstate Commerce Commission to issue $15,486 of California-Arizona lines first and refunding mortgage bonds for the purpose of effecting the exchange of bonds payable in sterling for bonds payable in dollars.

BALTIMORE & OHIO.—This company has applied to the Interstate Commerce Commission for authority to nominally issue $2,744,000 of its refunding and general mortgage six per cent Series B bonds maturing December 1, 1995, in reimbursement of expenditures made on property subject to the mortgage, and also to issue bonds of various subsidiary companies to be pledged as further security under the refunding and general mortgage.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—The Interstate Commerce Commission has authorized this company to issue as of July 21, 1920, three promissory notes amounting to $87,000 and to assume payment of nine promissory notes amounting to $18,000.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—This company has been authorized by the Interstate Commerce Commission to sell at par $770,000 of Series A, 1917, equipment trust certificates and to assume the obligation of paying the principal and interest of $950,000 Series B, 1920, equipment trust certificates, to be sold at 97 per cent of par or better.

GULF, MOBILE & NORTHERN.—This company has applied to the Interstate Commerce Commission for authority to issue $4,000,000 of an authorized issue of first mortgage gold bonds, of which $2,806,000 is to be used to secure loans to replace bank loans now outstanding, also a loan from the revolving fund of $515,000 and $480,000 to be funded by the director general of railroads, and the remainder $1,194,000 is to be retained in the treasury to be used from time to time.

ILLINOIS CENTRAL.—The Interstate Commerce Commission has authorized this company to execute an equipment trust and to obligate itself to pay $8,107,000 of 15-year equipment trust gold certificates and attached dividend warrants for the purchase of $13,515,918 of equipment. Kuhn, Loeb & Co., of New York, have agreed to purchase the entire issue at 97.36 per cent of par. No commission will be paid and no other expense will be incurred. The balance of the cost of the equipment, $4,440,000, will be paid from a loan for that purpose from the United States.

MAINE CENTRAL.—This company has been authorized by the Interstate Commerce Commission to issue $3,619,000 of first and refunding mortgage 6 per cent gold bonds maturing December 1, 1935, to pledge $2,067,000 of the bonds with the Secretary of the Treasury as security for loans from the United States, to pledge $1,152,000 of the bonds as security for a loan for the financing in part of certain acquisitions of equipment, additions and betterments, and to pledge $400,000 of the bonds as security for a loan to redeem certain bonds of the Knox & Lincoln Railway maturing on February 1, 1921.

MIDLAND & NORTHWESTERN.—This road presented a petition before United States District Judge W. H. Smith at El Paso, Tex., on October 16, asking that the receiver for the road be authorized by the court to issue certificates in indebtedness amounting to $100,000 for rehabilitation of the road. The Midland & Northwestern is a line 65 miles long running from the Texas & Pacific at Midland, Tex., to Seminole. The road was completed in 1918 and was operated under federal control as a feeder to the Texas & Pacific. It was placed in the hands of the receiver on March 1, 1920, and on July 20 ceased to

operate. In the testimony before Judge Smith a number of ranchers and business men of the district served by this road testified. The petition was taken under advisement. However, Judge Smith announced that he would name A. W. Norcop master in chancery to handle the affairs of the road in connection with the receiver.

NEW YORK, NEW HAVEN & HARTFORD.—This company has been authorized by the Interstate Commerce Commission to issue $2,000,000 of 7 per cent promissory notes and $8,130,000 of demand promissory notes and to issue and pledge $3,500,000 of equipment trust notes.

NORTHERN PACIFIC.—The Interstate Commerce Commission has approved the making of a loan to this company of $6,000,000 to aid the company in providing additional motive power, freight cars and additions and betterments to equipment, way and structures at a total estimated cost of $15,000,000. The company is to finance $10,000,000 to meet the government loan.

OCEAN SHORE.—This company has filed with the Interstate Commerce Commission an application for authority to abandon the operation of its line from San Francisco to Tunitas Glen and from Santa Cruz to Swanton, Cal. The application states that since the organization of the company in 1911 the business offered has not produced sufficient revenue to pay operating expenses and the stockholders have been assessed seven times. The growth of the automobile trucking business has seriously and adversely affected its freight revenues and the general increase in the use of automobiles has affected its passenger revenues, and both factors may be expected to retard any further increase in its business. The employees "with practical unanimity left its employ," thereby forcing the company to cease operations, on its refusal to raise wages to the scale awarded for the large railroads by the Railroad Labor Board. In the opinion of the company no increase in rates could be made which would result in larger revenues. The Railroad Commission of California has authorized the abandonment of the line to Tunitas Glen and an application for the remainder of the line is still pending before it.

PENNSYLVANIA RAILROAD.—The Interstate Commerce Commission on October 22 approved a loan of $6,780,000 to this company for making additions and betterments to its roadway and structures.

POTATO CREEK.—This company has filed an application with the Interstate Commerce Commission for authority to abandon that portion of its line extending from Keating Summit to its connection with the Pennsylvania at Liberty, Pa., 2½ miles, and on completion of a branch from Keystone 2 miles north to a junction with the Pennsylvania at Hamlin Siding, to abandon its line from Liberty to Norwich, 12 miles.

COAST ARTILLERY TRAIN IN MASSACHUSETTS.—The Forty-second Regiment, Railroad Artillery, of the Coast Artillery Corps, the only complete railroad artillery unit maintained by the United States army, passed through Providence yesterday and occupied nearly a mile of track while supplies were taken aboard and the last details of assembling the unique train were carried out. Forty-three cars were included in the travelling coast defence outfit, and carried personnel, armament and commissary of the regiment, which is en route from summer manœuvres on the New England coast to Railroad Artillery headquarters, Camp Eustis, Va., for the winter. Ten additional cars were to be added at New London. Because of State regulations in New York preventing the conveying of explosives over bridges and through tunnels, the train will be temporarily disbanded at New York City, the ammunition and artillery cars crossing the river on flats to the Jersey City terminals. The 42nd regiment has just completed its coast defence manœuvres at Rockland and Provincetown, Mass., including an extensive target practice which has been in progress since early in August. The regiment is quartered, fed and maintained entirely aboard the cars at all times. The train includes hospital cars, for caring for sick or injured; commissary cars, for the daily meals; sleeping and quarters cars, supply cars, kitchen cars, gun flats, ammunition coaches, machine shop cars and cars carrying full equipment for laying new railroads on short notice. Neither here nor in France, where railroad siege guns were an innovation, has a regiment been furnished in full detail before.—*Providence Journal.*

Railway Officers

Executive

Lee W. Spartlen has been appointed assistant to the president of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, effective November 1.

R. M. Dozier, assistant freight traffic manager of the Missouri Pacific, with headquarters at Chicago, has been elected president of the Union Railway, with headquarters at Memphis, Tenn., effective October 1.

Financial, Legal and Accounting

W. V. Wilson, assistant comptroller of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, has been appointed comptroller, succeeding G. J. Bunting, resigned, effective November 1.

William W. Smithey, whose appointment as auditor of the Houston & Brazos Valley was announced in the *Railway Age* of October 1 (page 593), was born at Ft. Worth, Tex., on January 20, 1880, and entered railroad service in September, 1900, with the Ft. Worth & Rio Grande. From January, 1907, to September, 1913, he served as a clerk and division accountant with the Gulf, Colorado & Santa Fe, and as traveling accountant with the Missouri, Kansas & Texas. On the latter date he resigned from railroad service to engage in business for himself, but in September, 1915, reentered railroad service in the office of the superintendent of the Southern Pacific, at Ogden, Utah. In January, 1916, he became traveling accountant of the Oregon Short Line, with headquarters at Salt Lake City, Utah, a position which he held until August, 1918, when he was appointed traveling accountant on the International & Great Northern, with headquarters at Houston, Tex. At the time of his recent appointment Mr. Smithey was special accountant for the Gulf Coast Lines, with headquarters at Houston.

Operating

C. E. Leverich, superintendent of the Denver & Rio Grande at Grand Junction, Colo., has been appointed superintendent at Gunnison, Colo., succeeding D. E. Wilcox, assigned to other duties. **J. A. MacKinnon** has been appointed superintendent at Grand Junction, succeeding Mr. Leverich. These changes became effective October 15.

A. T. Dice, Jr., has been appointed assistant superintendent of the Philadelphia & Reading, with headquarters at Reading, Pa. **N. W. Jones** has been appointed assistant superintendent, with headquarters at Philadelphia. **N. T. Heisey,** trainmaster at Rutherford, Pa., has been appointed trainmaster with headquarters at Harrisburg. **B. H. Bowman** has been appointed assistant trainmaster at Rutherford, Pa. **W. D. Kinzie,** division engineer at Reading, has been appointed assistant superintendent at Tamaqua, Pa. These appointments are effective October 20.

Traffic

C. E. Thomas has been appointed commercial agent of the Midland Valley, with headquarters at Wichita, Kan.

W. D. Clifton has been appointed general agent of the freight department of the Union Pacific, with headquarters at Omaha, Neb.

D. M. Davis has been appointed general agent of the Chicago & North Western, with headquarters at Philadelphia, Pa., effective October 1.

F. F. Rice has been appointed traffic manager of the Cairo, Truman & Southern, with headquarters at St. Louis, Mo., succeeding **H. C. Rich,** who has resigned.

A. E. Ladwig has been appointed general agent of the Chicago & North Western, with headquarters at Detroit, Mich., succeeding F. G. Fitzpatrick, effective October 1.

C. C. Divine, traveling freight agent on the Chesapeake & Ohio, with headquarters at Columbus, Ohio, has been appointed commercial agent, with headquarters at Cleveland, Ohio.

R. L. Fairburn, general passenger agent of the Canadian National at Toronto, Ontario, has been appointed assistant passenger traffic manager, Eastern Lines, with headquarters at Toronto.

H. L. Purdy, division passenger agent of the Wabash, with headquarters at Chicago, has resigned to become general manager of the T. & S. Tours Company, Chicago, effective November 1.

A. J. Bessolo has been appointed district freight agent of the Gulf, Mobile & Northern, and **W. R. Tice** has been appointed commercial agent, with headquarters at Detroit, Mich., effective October 1.

S. D. Lutz, vice-president in charge of traffic of the Chicago & Alton, with headquarters at Chicago, has had his jurisdiction extended over the traffic department of the Peoria Railroad Terminal Company, effective September 26, with the same headquarters.

J. J. Devereux, traveling freight and passenger agent on the Atchison, Topeka & Santa Fe, with headquarters at Salt Lake City, Utah, has been promoted to general agent, with the same headquarters, effective October 1. Mr. Devereux succeeds **E. R. Leis,** who has resigned.

J. Noble Snider has been appointed coal freight agent of the New York Central, with headquarters at New York, effective October 16. Mr. Snider was born in Nyack, N. Y. He first entered railway service in 1904 as a stenographer and clerk in the coal traffic department of the New York Central. He occupied in turn various clerical positions, and in 1911 became chief clerk of the department. In March, 1918, he was appointed acting coal traffic manager in the absence of G. N. Snider, who was serving in Washington with the Fuel Administration. In August, 1918, he entered the army through the Infantry Officers' Training School at Camp Lee, Va. In January, 1919, he returned to the coal traffic department of the New York Central, where he remained until April of the same year, when he resigned to become sales representative for New York of Maderia, Hill & Co. He remained in this position until his recent appointment as coal traffic agent.

Mechanical

Charles A. Nelson, formerly senior mechanical engineer, Bureau of Valuation, Interstate Commerce Commission, will return to the mechanical engineer's office of the Delaware & Hudson, at Watervliet, N. Y., on November 1.

S. J. Kelley has been appointed master mechanic of the Erie, with headquarters at Hornell, N. Y. This appointment is the result of the division of the territory of C. H. Norton, who remains master mechanic of the Susquehanna and Tioga divisions, but relinquishes the Allegheny and Bradford divisions to Mr. Kelley. The change is effective October 21.

J. Gutteridge, foreman of the car department of the Kansas City Southern at Pittsburg, Kan., has been appointed general foreman, car department, with headquarters at Pittsburg, with jurisdiction over the entire line, effective October 16. **C. E. Oakes** has been appointed shop superintendent at Pittsburg, succeeding Wm. Turley, resigned, effective October 1.

C. J. Quantic, master mechanic of the Canadian National at Port Mann, B. C., has been transferred to Vancouver and given jurisdiction over all lines west of and not including Edmonton, Alta. **A. H. Mahan,** district master mechanic of the Grand Trunk Pacific at Edson, Alta., has been appointed assistant master mechanic of the Canadian National and the Grand Truck Pacific, with the same headquarters. Mr. Mahan will have jurisdiction over the lines from Edmonton, Alta., to McBride, B. C., and from Edson, Alta., to Mountain Park, Alta. **A. Walts,** district master mechanic of the Grand Trunk Pacific, with headquarters at Smithers, B. C., has been appointed assistant master mechanic of the Canadian National and the Grand Trunk Pacific, with the same headquarters. His jurisdiction will include all lines from McBride, B. C., to Prince Rupert. These appointments are effective October 19.

Engineering, Maintenance of Way and Signaling

W. E. Rivers has been appointed division engineer on the Canadian National, with headquarters at Kamloops Junction, B. C.

R. C. Bardwell, chemist for the Missouri Pacific at St. Louis, Mo., has been appointed engineer, water service, with the same headquarters, effective October 1.

F. D. Nauman, roadmaster on the Oregon Short Line, with headquarters at Cache Junction, Utah, has been promoted to division engineer, with headquarters at Pocatello, Idaho, effective October 18, succeeding **William Travers,** deceased.

J. S. Goodman, division engineer of the Philadelphia & Reading at Tamaqua, Pa., has been appointed division engineer at Reading, Pa., succeeding W. D. Kinzie. **N. W. H. Schafer,** division engineer at Harrisburg, Pa., has been appointed division engineer at Tamaqua, succeeding Mr. Goodman. **W. R. Dunn,** supervisor at Philadelphia, has been appointed division engineer at Harrisburg, succeeding Mr. Schafer. These appointments are effective October 20.

Obituary

George P. Biles, freight traffic manager of the Southern, Lines West, with headquarters at Cincinnati, Ohio, died October 7 at Hollywood, Cal. Mr. Biles was born in England on July 18, 1857, and entered railroad service in 1872 as a ticket clerk at the Victoria station of the London, Brighton & South Coast at London, England. In 1877, he became a clerk in the parcels department of the same road at its London Bridge station, and in October, 1883, entered American railroad service at Chattanooga, Tenn., as a rate clerk in the general freight office of the Alabama Great Southern, a subsidiary of the Southern. In January, 1884, he became a rate clerk in the general freight office of the Queen & Crescent, with headquarters at Cincinnati, Ohio, and served successively with that road as chief rate clerk and assistant general freight agent until 1895, maintaining his headquarters at Cincinnati throughout this period. On October 15, 1895, he was appointed general freight agent of the Cincinnati, New Orleans & Texas Pacific, also a part of the Southern system, with headquarters at Cincinnati, and in January, 1907, he was made freight traffic manager of this road, with additional jurisdiction over the Alabama Great Southern. In January, 1917, Mr. Biles was appointed freight traffic manager of the Southern, the position he held at the time of his death.

G. P. Biles